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Comprehensive Water Resources Study

Town of Midland

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Environment Ontario

MINISTRY OF THE ENVIRONMENT

COMPREHENSIVE WATER RESOURCES STUDY

OF THE

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I INTRODUCTION

This report is a comprehensive assessment of the status of municipal water pollution control in the Town of Midland. The municipal water works and pollution control works are evaluated for present and future requirements. Existing and potential sources of pollution and the effects of these on receiving streams are pointed out and discussed along with the OWRC 1966 Water Pollution Survey Report. When sources of pollution are found, recommendations are made to the responsible authorities for corrective action. Where municipal water works and/or pollution control works appear desirable or expansions to present facilities are necessary, the Ministry of the Environment has a program to aid in the construction of these works.

On April 1, 1972, the Commission was incorporated into the Ontario Government's new Ministry of the Environment and will be referred to in this report as both the OWRC and the Ministry of the Environment.

II SUMMARY AND CONCLUSIONS

A comprehensive assessment was made of the municipal water and sewage works facilities in the Town of Midland. Also a survey was conducted to determine existing and potential sources of pollution and their effects on the water quality of local watercourses.

The Town of Midland with a population of 11,000 is served almost entirely by the municipal water works system. The water works consists of a number of wells and collection reservoirs which may be recharged by a spring-fed creek. The water supply capacity is deficient and the municipality is presently developing an additional well supply. The addition of a new well should bring the water supply up to present day minimum requirements; however, further supplies will

be required to meet further demands. Essentially, a surface water supply utilizing Georgian Bay should be developed to meet future area water requirements on a long-term basis.

Approximately 90 per cent of the developed area in the municipality is served by a sewage collection system consisting of combined and sanitary sewers in which sewage wastes are directed to a 1.25 MGD primary sewage treatment plant. The plant was designed for a population of 12,500 at 100 gpcd and can accept a peak flow of 5.0 MGD (4 DWF). The average daily sewage flow during 1971 was 1.46 MGD which was 16.8 per cent above the design flow. Although the plant received flows above design capacity, sewage treatment was not greatly affected as adequate retention for sedimentation was still being provided in the primary tanks. However, the plant capacity should be enlarged.

With the existence of combined sewers, the quantity of surface runoff gaining access to the collection system is excessive especially during spring runoff and heavy rainfall periods. During these times, bypassing of sewage is prevalent at the storm overflow chambers and at the sewage treatment plant. In its sewer separation and sewage works program, the municipality should give priority to sewer separation for storm water elimination. Bypassing of raw sewage should be avoided unless in extreme emergency cases.

A water quality study of southern Georgian Bay by the OWRC Division of Laboratories indicated that Midland Bay was an area which was over-enriched and showed evidence of algal blooms. Phosphorus inputs from municipal sources was the causative nutrient for over-enrichment and it was recommended that every effort be made to curb further inputs to the bay. Phosphorus removal facilities

are required to be installed and in operation at the Midland Water Pollution Control Plant by December 31, 1973. Phosphorus inputs will still originate from bypassed sewage from the sewage collection system.

Bacteriological examination and chemical analyses of samples collected of the discharges from the municipal storm sewers indicated that domestic wastes were gaining access to most of the storm sewers. Of particular importance are the two storm sewers outfalling to Little Lake. It was found that during runoff periods the discharges from the storm sewers contained domestic wastes and at the beach area, the bacteriological water quality had deteriorated to a degree which would be questionable for swimming purposes. Generally, however, the bacteriological water quality of Little Lake was satisfactory. The municipality should investigate the probable illegal connections to the storm sewers and eliminate the discharges of contaminating wastes to the storm sewers.

A chemical sample collected from the sanitary sewer from Bay Mills Limited showed that a discharge of dye solution contained a BOD and suspended solids concentration in excess of the limits set out in the Sewer Use by-law. The concentration of the dye solution was such that the final sewage treatment plant effluent was completely coloured and depending on the colour of the dye it would be aesthetically unacceptable for discharge to Midland Bay. Also the BOD concentration in the final effluent was higher than normal. With the number of industrial waste discharges to the sewage collection system and the apparent illegal sanitary connections to the storm sewer system, the municipality should consider retaining a by-law enforcement officer to investigate these matters and enforce the Municipal Sewer Use By-law.

The Province of Ontario in its report, "Design for Development: Toronto-Centred Region" had disclosed that a part of the development strategy for the Toronto-Centred Region was the stimulation of two growth areas, one of which was Midland. The Tiny - Tay Peninsula Planning Area realizes the potential rapid urbanization and industrialization for the area and the need for regional planning. However without legislation the Planning Area remains powerless in controlling development and at present, development is being allowed without full municipal services in the townships adjacent to the urban centre, Midland. The Tiny - Tay Peninsula Planning Area should strive to seek legislation in order to achieve regional planning.

III RECOMMENDATIONS

1. According to the requirements of the Ministry of the Environment, the existing water supply capacity is inadequate and the municipality should complete the development of an additional well supply as soon as possible.

2. Consideration should be given to developing a surface water supply utilizing Georgian Bay to meet long range future water requirements.

3. The sewage treatment plant capacity should be expanded.

4. Installation and operation of phosphorus removal facilities at the sewage treatment plant will be required by December 31, 1973. Initial plant studies have been completed by the Research Branch of the Ministry of the Environment.

5. The storm water separation and associated sewage works program should be revised to accelerate the storm water separation program. Staging of the new program should be mutually agreed upon by the Municipality and the Ministry of the Environment.

6. Contaminating wastes gaining access to the municipal storm sewer system should be investigated and eliminated. Particular attention should be given to the storm sewers outfalling to Little Lake.

7. Decor Metal Products should continue its efforts to ensure that industrial waste discharges from the plant are within the limits as set out by the Ministry of the Environment and the Town of Midland.

8. Industrial waste discharges to the municipal sanitary sewer system from Bay Mills Limited should be investigated to ensure that the concentrations are within the limits of the municipal sewer use by-law. Formal investigations will be made by the Industrial Wastes Branch of the Ministry of the Environment.

9. The municipal sewer use by-law should include criteria for the discharge of dye to the municipal sanitary sewers whereby the aesthetic water quality of the receiving watercourse is not deteriorated through discoloration by the presence of that dye in the final effluent of the municipal water pollution control plant.

10. An officer should be retained to enforce the Municipal Sewer Use By-law.

11. The Tiny - Tay Peninsula Planning Area should strive to achieve legislation giving the Planning Area control to plan and stage development in the area.

12. The Simcoe County Health Unit should investigate the adequacies of private sewage disposal systems adjacent to Little Lake.

IV GENERAL

The Town of Midland with a 1971 assessed population of 11,004 (1972 Municipal Directory) is located in the County of Simcoe on the south shore of the eastern portion of Georgian Bay. By highway, the municipality is situated at the junction of Highways No.'s 12 and 27, 90 miles north of Toronto and comprises approximately 3,400 acres with the Townships of Tay and Tiny bordering the municipality.

Besides being a Great Lakes shipping port, the Town of Midland is becoming increasingly more an urban and industrial centre. According to the 1971 Industrial Surveys of Ontario Municipalities, Department of Trade and Development, approximately 30 per cent of the town's population is employed in manufacturing, retail and government establishments. From 1968 to 1971 the population has increased 5 per cent. However, the population has remained relatively the same over the past two years. During the summer season the population increases with the influx of tourists to the area.

Midland is served by municipal water and sewage works systems. The water distribution system serves approximately 100 per cent of the town; the sewer collector system consisting of separate and combined sewers serves approximately 90 per cent of the developed area.

The topography of the land is predominantly moderately to steeply sloping. The soil material in the southern portion of the municipality is a sandy-loam till. To the north the soil is an outwash sand of a sandy-loam type and to the north-west the soil is a gravelly sandy-loam type. All the soils are moderately stony.

Drainage in the area is good with surface runoff being directed to Midland Bay via the storm sewer system. Storm drainage is also directed to Little Lake which is located within the town boundaries. Overflow from Little Lake is intermittent to Midland Bay. The Wye River located on the eastern boundary of the town also receives surface runoff from the south-east area and flows north to Midland Bay.

V MUNICIPAL WATER WORKS

A. Description of Works

Domestic water for the municipal system is obtained from four wells, No.'s 1, 2 , 3 and 6 and two surface water collection reservoirs. Wells No.'s 2, 3 and 6 are located within the same area as the collection reservoirs north-west of Vindin and Fifth streets. Well No. 1 is located behind the Midland Public Utilities Commission office east of Fourth Street. The wells in the vicinity of the collection reservoirs are recharged by two dams on a spring-fed creek which flows through the area to Midland Bay. Water from the same creek is also directed through two separate open channels filled with coke for filtering purposes to the two collection reservoirs. Facilities to pump water from Midland

Bay to the well area were used in the past to recharge the aquifer but have since been abandoned due to the high water level at the bay pumphouse.

Water from the wells is pumped to a concrete flume downstream from the collection reservoirs where water from the reservoirs is also directed. From the concrete flume, the water flows via a gravity feedermain to the wet well at the high lift pumping station. Water from Well No. 1 is pumped directly into the feedermain prior to the pumping station. The overflow elevation at the concrete flume is the same as the high water level in the wet well at the pumphouse, thereby eliminating the need for an overflow in the wet well.

There are no float switches in the wet well and the well pumps are operated manually at the high lift station when the high lift pump is put into operation. The high lift pump is also operated manually and is put in service when the pressure in the distribution system drops to 95 psi. The high lift pumps and well pumps are shut down by the water works operator when an alarm indicates that the elevated storage tank is full.

Chlorination is the only treatment provided and is applied in the gravity feedermain just prior to the wet well at the pumping station.

The water is then pumped from the high lift station to the distribution system including an elevated storage tank and a standpipe.

In the past few years the municipality has utilized water from the RCA Limited water supply; however, with the development of Well No. 6 and the contract with RCA Limited expiring, the municipality no longer obtains RCA Limited water on a routine basis but may do so only in extreme emergency cases.

The Public Utilities Commission also maintains an industrial water supply in which water from Midland Bay is pumped to two industries, Bausch and Lomb Optical and Midland Industries.

A physical description of the municipal water works system is included in Appendix A of the report.

B. Pump Capacities

The pumping capacities of the wells are as follows:

No. 1 Well -	150 IGPM	=	216,000 GPD
No. 2 Well -	50 IGPM	=	72,000 GPD
No. 3 Well -	80 IGPM	=	115,000 GPD
No. 6 Well -	400 IGPM	=	576,000 GPD
TOTAL	680 IGPM	=	979,200 GPD

The total pumping capacity of the wells is approximately 980,000 IGPD. The two collection reservoirs have a total capacity of 529,000 gallons. The high lift pumping capacity is 1,750 GPM or 2.52 MGD. Therefore, the limiting factor is the capacity of the wells.

C. Water Pumpage and Usage

Summaries of water pumpages for the years 1969, 1970 and 1971 are included in Appendix B. In 1970 a total of 310.8 million gallons was pumped to the distribution system by the Public Utilities Commission. This was an increase in pumpage of 5.06 per cent over the 1969 pumpage. In addition, 40.8 million gallons of water from the RCA Limited water works were utilized by the Public Utilities Commission; this was a decrease of 12.4 per cent from the 1969 figure. The average daily water consumption in 1970 was 963,000 GPD. With the population

being 11,004 an average daily per capita consumption of 87.5 GPD was indicated. This was an increase of 2.7 per cent over 1969. A maximum day pumpage of 1.60 MGD occurred in the month of June.

In 1971 an average daily pumpage of 970,000 GPD was indicated; this was an increase of less than 1 per cent over the 1970 average. The average daily per capita water consumption was 88 GPD. A maximum day pumpage of 1.546 MGD occurred again in the month of June. The small increase in water pumpage was in keeping with the relatively stable population.

For 1970, the Midland Public Utilities Commission recorded 3,531 water services. Of these, 469 were commercial and industrial users. A partial list of the industries with the average daily water consumption for each is found in Appendix C. The total average daily consumption of industrial and commercial establishments is estimated between 250,000 - 300,000 GPD. Therefore, the estimated residential per capita consumption is 65 GPD shown in Appendix D.

D. <u>Water Quality</u>

A routine bacteriological sampling program is maintained by the Public Utilities Commission and the results indicate that the bacteriological water quality is satisfactory. Chlorine for disinfection purposes is applied before the water is pumped to the distribution system; the minimum required combined chlorine residual of 0.5 ppm is maintained at all times after the 15-minute contact period.

Chemically, the water is also satisfactory, although it is hard. Appendix D shows the results of chemical analyses of the treated water.

E. Present and Future Water Requirements

For an adequate and reliable water supply the system should meet the Canadian Underwriters Association's requirements. Under certain emergency or unusual conditions, the water supply should be able to meet fire flow delivery in a specified number of hours with consumption at the maximum daily rate.

Calculations for the present storage requirements using the Canadian Underwriters Association's standards are shown in Appendix E, Table 1. In determining the storage requirements the use of the RCA Limited water supply was excluded although in actual emergency cases, the PUC could use the RCA Limited supply up to 500 GPM.

As there are no emergency standby pumping facilities at the wells, the two collection reservoirs are used as a standby source (total capacity 529,000 gallons). Reportedly, a maximum flow of 1,500 GPM can be obtained from the reservoirs. Using the CUA fire flow period of 10 hours, a flow of 880 GPM can be sustained. The OWRC requirement is 50 per cent of the CUA fire flow period and therefore a flow of 1,500 GPM can be sustained for a 5-hour period.

For the CUA requirements, two major pumps must be considered inoperative at the time of fire flow and maximum day consumption. Therefore eliminating Wells 1 and 6, this leaves only 130 GPM from Wells 2 and 3 plus 880 GPM from the two collection reservoirs. With the existing storage being 366,000 gallons, there is a storage deficit of 1,434,000 gallons or an equivalent water supply capacity of 2,400 GPM. The high lift pumping capacity would have to be increased by 810 GPM. If all the pumps are operative a storage deficit of 1,104,000 gallons is indicated or an equivalent water supply capacity of 1,840 GPM.

As the OWRC requires 50 per cent of the fire flow period, the storage deficit with two wells out of commission would then be 348,000 gallons (Appendix E, Table 2) or an equivalent pumping capacity of 1,160 GPM. With all the pumps operative the storage deficit would be 183,000 gallons or an equivalent pumping capacity of 610 GPM.

The basic minimum requirement for a water supply is that the capacity of the source of supply must meet the maximum day demand. In 1970, the maximum daily water consumption including the use of water from RCA Limited was estimated at 1.75 MGD. In 1971, the maximum day pumpage was 1.55 MGD. Taking the extreme case the required capacity would be 1,215 GPM. The existing water supply capacity includes 680 GPM from the wells and approximately 400 GPM from the reservoirs, for a total water supply capacity of 1,080 GPM. It would appear that there is a present deficiency of water supply of 135 GPM.

In 1963, the Midland Public Utilities Commission requested the Ontario Water Resources Commission to study the possibilities of obtaining a more adequate water supply. Consequently, a ground water survey in 1964 was initiated and a test drilling program was conducted in which a well site in Little Lake Park showed a potential yield of 700 GPM. However, development of this well was abandoned due to the high cost of construction.

In 1966, the OWRC received a request from the municipality for the development of a Provincially-financed water works program. As the continued use of ground water sources was limited in meeting the water requirements for future development, the OWRC retained the firm, Canadian British Engineering Consultants Limited, to prepare a design report on a water treatment plant and a system of trunk mains and storage utilizing Georgian Bay as the source of supply. Upon completion of the report, the OWRC submitted the proposal to the

municipality. In the design report by Canadian British Engineering Consultants Limited, a projected population for 1975 was estimated at 12,200 with a maximum daily demand of 2.61 MGD. The 1989 estimated population is 16,600 with the maximum daily demand of 4.0 MGD.

In early 1969 the municipality indicated that it was reluctant to proceed with the OWRC program because of the high capital costs and it would proceed to investigate the possibility of developing further ground water sources. International Water Supply Limited reported that the original wells had deteriorated since construction and should be refurbished. The wells were then refurbished and Well No. 6 was drilled replacing Wells No. 4 and 5. In addition, test drilling in the Evergreen Road area by International Water Supply produced a test well of 350 GPM.

It has been a question as to whether to develop the Georgian Bay water supply to meet the long range (20 year period) future water requirements or to develop well supplies piecemeal to meet present demands.

Maximum day consumption figures of 1.75 MGD and 1.546 MGD occurred in 1970 and 1971 respectively. With the total pumping capacity of the wells being 0.98 MGD, the PUC has utilized the two water collection reservoirs and has recharged the area in the past by pumping water from Midland Bay. However, the water level in Midland Bay has risen such that flooding of the pumphouse at the Bay has occurred and the availability of the Bay water as a recharge source presently does not exist. This now leaves the reservoirs as the only standby source and its limitations being the spring-fed creek are not known.

As pointed out previously, the water supply is deficient and to bring the supply up to present day minimum requirements an addition well supply of an approximate capacity of 135 GPM is required. However, to meet the Ministry's fire requirements an additional supply of 610 GPM is required.

For any future development the municipality would have to fulfill the needs for an adequate and reliable water supply and should therefore expedite its program of developing an additional water supply.

VI MUNICIPAL WATER POLLUTION CONTROL PLANT

A. Description of Works

The Midland Water Pollution Control Plant operated by the Ministry of the Environment for the municipality is a primary sewage treatment plant with a design flow of 1.25 MGD based on a design population of 12,500 at 100 gpcd. A peak flow of 5.0 MGD (4 x dry weather flow) can be treated. The sewage treatment plant is designed for a raw sewage strength of 225 ppm of BOD (2,812 lbs./day) and 300 ppm of suspended solids (3,750 lbs./day). The plant was designed on the basis of 40 per cent reduction of BOD and 60 per cent removal of suspended solids.

The treatment units consist of a barminutor, a detritor for grit removal, two primary sedimentation tanks and a chlorine contact chamber. A two-stage digestion system is provided for sludge treatment. The final plant effluent is discharged to Midland Bay. A physical description of the plant is included in Appendix F.

B. Hydraulic Loading

Tables for plant flows occurring in 1970 and 1971 are found in Appendix H.

In 1970 a total of 485.4 million gallons of raw sewage was treated at the plant at an average daily flow of 1.33 MGD. This was 6.4 per cent above the design flow. A maximum daily flow of 2.3 MGD occurred in the months of March and April during the spring runoff period. A minimum daily flow of 0.82 MGD occurred in the month of January. A total of 332 daily flow charts were perused and it was indicated that the plant received flows in excess of its design capacity for 209 days or 63 per cent of the time. However, due to the detention time provided in the primary settling tanks, the effluent quality was not seriously affected. In 1970, bypassing at the plant occurred for an approximate total of 22 hours in 21 days according to the flow charts. Bypassing occurs when the flow rate exceeds 5.0 MGD which may occur during spring runoff or heavy rainfall.

In 1971 a total of 463.76 million gallons was treated at the plant in 317 metered days for an average daily flow of 1.46 MGD which was 16.8 per cent above the design flow. A maximum daily flow of 4.0 MGD occurred in April. A total of 258 daily flow charts from January to October excluding May, were perused and it was indicated that the plant was receiving flows in excess of the design capacity for 164 days or 63.5 per cent of the time. Although the plant was hydraulically overloaded the effluent remained satisfactory as the detention time in the primary tanks was not critically shortened. Bypassing occurred in 1971 for an approximate total of 19 hours in 18 days during spring runoff and heavy rainfall periods.

According to the 1970 daily flow charts, the majority of the days

in which the plant flows were within the 1.25 MGD design flow occurred on the weekends with an average sewage flow of 1.1 MGD. The corresponding daily water consumption during this period was approximately 888,000 GPD. During the Christmas and New Year's holidays when it would be expected that there would be a complete shutdown of industries an average flow of 852,000 GPD was received at the sewage treatment plant. The corresponding PUC water pumpage was 643,000 GPD. Although the area served by sanitary sewers is less than that served by the water distribution system an additional flow to the sewage treatment plant of approximately 200,000 GPD was received.

Similarly, in 1971 the daily flow charts indicated that most of the plant flows within the design capacity occurred during the weekends at an average daily flow of 1.08 MGD. The corresponding PUC water pumpage during the weekends was 845,000 GPD. The additional flow to the sewage treatment plant was approximately 235,000 GPD. This additional flow of approximately 200,000 GPD during the weekends may be due to infiltration into the sewage collection system.

In 1970, the days in which the plant flows exceeded the design flow were 89.5 per cent week days or during normal work days. The average daily flow during the week days was estimated at 1.38 MGD. This flow figure is representative of dry weather flow or flow with very little precipitation. The average daily flow for the year was 1.33 MGD. The average daily water consumption for the year was .963 MGD. Therefore, the additional sewage flow to the plant is 417,000 GPD during the week days. Of this it is assumed that 200,000 GPD is due to infiltration; therefore, the remaining 200,000 GPD could be attributed to private domestic and industrial water supplies with waste discharges to the municipal sanitary sewer system.

Of the 164 days in which the flows exceeded the design flow in 1971, 130 days were week days with flows between 1.25 MGD (design flow) and 2.0 MGD. Flows occurring within this range would be typical of normal week day flow during periods of dry weather flow or with little precipitation. Flows approaching 2.0 MGD and greater, would be caused by runoff gaining access to the combined sewers. The estimated average daily flow between 1.25 and 2.0 MGD during the week days was 1.45 MGD which corresponds to the year's average daily flow. The approximate PUC water consumption during the week days was 1.06 MGD. Therefore, the additional flow to the sewage treatment plant is 390,000 GPD similar to 1970.

Although there is a sewer separation program in effect, sewage flows do not appear to be decreasing and are probably being offset by increased sewering of the area. It is concluded that the plant is operating above the design flow by 16.8 per cent during normal dry weather flow. Satisfactory treatment is still being provided as there is adequate detention time in the primary tanks. The municipality should investigate the possibility that there are sewer connections from premises utilizing private water supplies of large capacities.

Water consumption and sewage flow comparisons are found in Appendix I.

C. Organic Loading and Plant Efficiency

In 1970, the average BOD and suspended solids concentration in the raw sewage were 118 ppm and 202 ppm, respectively. With the average daily flow being 1.33 MGD, the loading to the plant was 1,569 lbs. BOD and 2,687 lbs. suspended solids per day as compared to the design loading of 2,812 lbs. BOD and 3,750 lbs.

suspended solids. The average BOD and suspended solids concentration in the final effluent were 74 ppm for each indicating a plant efficiency of 37 per cent BOD reduction and 63 per cent suspended solids removal which is satisfactory for the type of treatment provided.

The 1971 average BOD and suspended solids concentration in the raw sewage were 105.5 ppm and 193 ppm, respectively. This represents a loading to the plant of 1,540 lbs. BOD and 2,780 lbs. suspended solids per day at an average daily flow of 1.46 MGD. The final effluent had an average BOD of 73 ppm and suspended solids concentration of 65 ppm indicating a removal efficiency of 30.5 per cent and 66.4 per cent respectively within the expected range for primary plants.

Organic loadings and plant efficiencies for 1970 and 1971 are found in Appendix G.

D. Sewage Collection System

Approximately 90 - 95 per cent of existing development in the municipality is served by a system of combined and separate sewers of which it is estimated that 40 - 50 per cent are combined sewers. Sewage is directed to the water pollution control plant via four sewage pumping stations and a gravity sewer. The remaining portion of the town not on sewers utilize septic tank and tile bed systems.

Appendix J, Tables 1 and 2 show the approximate acreage served by the pumping stations and the PUC consumption flow figures to sewered areas.

(i) Vindin Street Pumping Station

This pumping station is located on Vindin Street between Fifth and Sixth streets and receives sewage via a system of combined sewers from an approximate area of 34.9 acres. The sewage pumping station is provided with two pumps rated at 360 US gpm and 300 US gpm giving a total available pumpage of 660 US gpm or 550 IGPM. The lead pump at 360 US gpm reportedly is sufficient to handle sewage pumpage during storm flow. Sewage is pumped to a gravity sanitary sewer at Fourth and Vindin streets.

There are no standby pumping facilities at the pumping station and no overflow is provided. Apparently problems of backed-up sewage to homes occur about once a year usually if a power failure lasts longer than two hours. In extreme emergency cases a liquid haulage truck is utilized to pump out the wet well and the sewage is then hauled to the treatment plant.

The estimated flow to the sewage pumping station using the PUC consumption figures as calculated in Appendix J is 14,670 GPD or 10.2 GPM (.0272 cfs). Adding an infiltration rate of .005 cfs per acre as suggested by the Midland Engineering Department, the dry weather flow (DWF) would be 75.2 GPM (0.20 cfs). At a maximum day factor of 1.8 the flow would be 84 GPM (0.224 cfs). If a design flow of .010 cfs per acre for a population density of 20 per acre is used instead of the PUC figures, the maximum estimated flow to the sewage pumping station would be 196.4 GPM (0.523 cfs). It would appear that the sewage pumps are capable of handling maximum flows including storm runoff.

(ii) Sewage Pumping Station No. 1

Sewage Pumping Station No. 1 is located adjacent to the intersection of Queen Street and Gloucester Street and discharges through approximately 3,810 feet of 14-inch diameter forcemain to manhole No. 10 at the entrance of

the sewage treatment plant. The area served by the pumping station is approximately 415 acres of which 210 acres are served by combined sewers. These figures include the Vindin Street pumping station area. Sewage flows to storm overflow chamber A prior to the pumping station.

The sewage pumping station is provided with three pumps: two rated at 780 US gpm and the third rated at 2,600 US gpm. The pumps are automatically controlled from levels in the wet well by means of a bubbler control system. Duty pump No. 1 (780 US gpm) operates initially when the sewage level rises. If the sewage level continues to rise standby pump No. 2 (780 US gpm) will start up and operate in parallel. The third pump (2,600 US gpm) is a storm pump and will operate under heavy inflow conditions. When pump No. 3 is in operation, pumps No. 1 and No. 2 do not operate. No overflow is provided at the pumping station as the relative elevations of the storm chamber and pumping station are such that the overflow level in the storm chamber is approximately equal to the maximum water level in the pumping station wet well. Therefore, excess sewage flow will overflow initially in the storm chamber preventing flooding of the pumping station.

The approximate flow to the sewage pumping station keeping in mind the PUC consumption figures is 420,252 GPD or 292 GPM (.778 cfs). This includes the 10,000 GPD from the Wagg's Laundry private water supply, all of the sewage flow from Ogilvie Limited, and 10 per cent of the flow from Pillsbury Canada Limited. Including an infiltration rate of .005 cfs per acre or a total of 2.075 cfs, the dry weather flow would be 2.853 cfs. At a maximum daily water consumption factor of 1.8, the flow to the pumping station would be 1.4 cfs and with infiltration it would be 3.475 cfs. The Ministry's Project Operations Branch has reported that the No. 3 storm pump is capable of delivering 2,100 IGPM

(5.6 cfs). Flows in excess of this will overflow in storm chamber A to Midland Bay.

(iii) Sewage Pumping Station No. 2

This pumping station is located east of the intersection of William and Frank streets and receives sewage from an area of 66 acres of which approximately 42 acres contain combined sewers. Sewage flows to storm overflow chamber B and then to the pumping station. The sewage is then pumped through approximately 50 feet of 6-inch diameter forcemain to William Street where the 14-inch forcemain from sewage pumping station No. 1 is located.

The pumping station is provided with two 9.0 HP Flygt CP-100 submersible pumps rated at 100 IGPM each. The Project Operations Branch of the Ministry of the Environment reported that when storm pump No. 3 in sewage pumping station No. 1 is in operation during high flow periods, sewage pumping station No. 2 with both pumps operating is capable of delivering 150 IGPM (0.4 cfs) to the 14-inch diameter forcemain on William Street. Apparently dry weather flow is about 50 GPM in which one pump normally handles the flow. For control of operation of the pumps, liquid level regulators are provided.

Sewage flow to chamber B as determined from the PUC consumption figures is approximately 70,217 GPD or 49 GPM (.13 cfs). At a maximum day factor of 1.8 the flow would be 88 GPM (.234 cfs). The infiltration rate would be .330 cfs or 124 GPM.

There is no overflow provided in the pumping station wet well as the high water level in the wet well is approximately the same as that of the overflow in the storm chamber so that overflow occurs in the storm chamber preventing flooding of the pumping station. Sewage overflow is directed to Midland Bay.

(iv) RCA Limited Pumping Station

This pumping station is located west of the RCA Limited property and approximately 2,300 feet north of the intersection of William Street and Highway No. 12.

The pumping station was designed to serve an equivalent population of 3,000 contained in an area of approximately 200 acres. At present the only flow to the pumping station is from the RCA Limited plant; the average design sewage flow is estimated at 800 employees x 50 gpcd = 40,000 GPD or 28 GPM. At the present, the average daily sewage flow is estimated at 15,000 gpd. The ultimate design flow from RCA Limited is 35 GPM with the ultimate peak flow being 105 GPM. The ultimate sewage flow to the pumping station which would include flow from expected future development is 940 IGPM or 2.5 cfs.

The sewage pumping station is provided with a sewage basket for screening purposes and two submersible Flygt pumps rated at 190 IGPM each. The pumps are controlled by liquid level regulators. No standby facilities are available; however, an overflow to an open ditch is provided. Space for a third pump in the station is also provided if required in the future.

The Project Operations Branch of the Ministry of the Environment reported that the maximum pumpage when the two existing pumps are operating in parallel is 300 GPM or 0.8 cfs. One pump is capable of handling normal maximum day flows. Sewage is pumped through 1,500 feet of 12-inch diameter forcemain to a manhole where a gravity feedermain begins. At this point the gravity sewer also receives sewage from the Bayview Subdivision. This sewage flow is estimated at 9,706 GPD according to PUC consumption figures.

Including an infiltration rate of .005 cfs per acre for an existing sewered area of 2.3 acres, the total sewage flow from the subdivision is approximately 15,906 GPD or 0.029 cfs.

Therefore, the approximate dry weather flow to the sewage treatment plant from the sanitary sewer is 31,000 GPD. The maximum daily flow would be 50,700 GPD.

The gravity sanitary sewer from the forcemain to the sewage treatment plant serves an area of 490 acres. An area south-east of Little Lake consisting of 360 acres will be served in the future by pumpage to the gravity sanitary sewer. The gravity sewer was designed to serve a total equivalent population of 15,000 over an area of approximately 1,080 acres. The design capacity of the sewer is 6,520,000 GPD or 12.1 cfs.

(v) Storm Overflow Chamber C

The remaining portion of the sewage flow from the municipality is directed by gravity to storm overflow chamber C. The overflow chamber is located at the intersection of William Street and Hugel Avenue. The area served by existing sanitary and combined sewers is approximately 560.4 acres of which 185 acres are served by combined sewers. The domestic waste flow from residential use is estimated at 352,196 GPD or .652 cfs using the PUC consumption figures. Also discharging to the sewered area are the industrial waste flows from Bausch and Lomb Optical, Midland Industries, and Dominion Electroplating; these total 92,300 GPD or .171 cfs.

The average dry weather flow to the chamber excluding infiltration is 444,496 GPD (.823 cfs). With a maximum day factor of 1.8 the flow to the chamber would be 725,300 (1.346 cfs).

Infiltration to the sewers using a rate of .005 cfs per acre would be 1.5 MGD or 2.8 cfs. The total maximum day flow including infiltration would be 4.146 cfs or 1.225 MGD.

The inlet to the overflow chamber is a 30-inch diameter sanitary sewer with a design capacity of 38 cfs. The outlet of the chamber is a 15-inch diameter sanitary sewer which directs the sewage flow via gravity to manhole No. 10 prior to discharge to the sewage treatment plant. The design capacity of the sewer is 7.0 cfs or 3.14 MGD. Any sewage flow in excess of 7.0 cfs will overflow in the chamber to a 30-inch diameter sanitary sewer which then directs the sewage overflow to storm overflow chamber B.

It appears that the 7.0 cfs sanitary sewer outlet from chamber C is capable of receiving maximum day flows. However, with the number of existing combined sewers in the collection system, overflow in the chamber would occur during storm runoff periods.

In Appendix K, Table 1, it was calculated that an average rainfall of 0.42 inches per hour occurred during the days in which sewage was bypassed at the sewage treatment plant. The hours of rainfall were obtained by reading the daily flow charts which indicated an upsurge of sewage flow to the plant due to the storm runoff.

In Table 2 of Appendix K it was estimated that the volume of storm runoff to chamber C would be 31.2 cfs during a rainfall of 0.42 inches per hour. This is assuming a runoff coefficient of 0.4. Therefore, with an average daily sewage flow of .823 cfs (excluding the infiltration rate) and a storm runoff of 31.2 cfs, the amount of overflow in chamber C discharging to chamber B would be 25 cfs.

In calculating the amount of storm overflow, the example of 0.42 inches per hour was chosen as a hypothetical case in which the duration of rainfall would have to be over several hours as the sewers do provide some storage. However, a lower rate of rainfall over several hours would also produce a substantial amount of overflow.

(vi) Storm Overflow Chamber B

Overflow chamber B is located at Frank and William streets and as mentioned previously receives sewage flow prior to the sewage being directed to sewage pumping station No. 2. There are two inlets to the overflow chamber: the 30-inch diameter overflow and sanitary sewer from chamber C and also a 12-inch diameter sewer from Frank Street. The design capacities of each are 37 cfs and 8.6 cfs, respectively, for a total possible inflow to the chamber of 45.6 cfs.

The average daily sewage flow to chamber B is 49,700 GPD or .092 cfs (excluding infiltration). In Appendix K, Table 3 it was calculated that during a rainfall of 0.42 inches per hour, the amount of storm runoff to the chamber from the combined sewer area would be approximately 7.13 cfs. In addition,

the overflow of 25 cfs from chamber C discharges to chamber B for a total inflow of 32.22 cfs or 12,050 GPM. Although the outlet of chamber B to pumping station No. 2 is an 8-inch diameter gravity sewer with a design capacity of 3.4 cfs, the pumping station can only pump 0.4 cfs or 150 GPM during peak flows. An overflow of 31.8 cfs or 715,000 gallons per hour during an average rainfall of 0.42 inches per hour will occur to Midland Bay.

(vii) Storm Overflow Chamber A

Storm overflow chamber A is located 400 feet west of sewage pumping station No. 1 and receives the sewage flow prior to the flow being directed to the pumping station. There are two sanitary collector sewers discharging into the storm chamber: the main interceptor sewer from Third and Montreal streets having a design capacity of 68.8 cfs from King Street to the chamber and also the Midland Avenue sewer having a design capacity of 16.9 cfs. The total possible inflow to the chamber is 85.7 cfs or 32,100 GPM.

The present average daily sewage flow to chamber A is 0.778 cfs (excluding infiltration). Under normal sewage flow conditions including maximum day water usage, the pumping station can accept the sewage flow and no overflow should occur. However, there are approximately 210 acres of area served by combined sewers and it was estimated that the storm runoff volume to chamber A would be 35.6 cfs (Table 4, Appendix K). During a rainfall of 0.42 inches per hour the total inflow to the chamber would then be 36.38 cfs as the outlet sewer of the chamber is designed for 5.8 cfs and the number 3 pump in the pumping station is only capable of handling 5.6 cfs, the overflow to Midland Bay would be 30.78 cfs or 690,000 gallons per hour.

(viii) Sewage Treatment Plant Overflow Chamber

Raw sewage converges from three areas prior to entry to the water pollution control plant. One is the 14-inch diameter forcemain which discharges sewage from pumping stations 1 and 2 to manhole No. 10; the peak pumping capacity of the pumping stations is 2,250 IGPM or 3,240,000 IGPD. Also discharging to manhole No. 10 is the William Street sanitary sewer from overflow chamber C; the capacity of this gravity sewer is 7.0 cfs or 3,770,000 GPD.

Raw sewage then flows from manhole No. 10 to the sewage treatment plant overflow chamber via a 24-inch diameter gravity sewer. The third sanitary sewer which receives sewage from the RCA Limited pumping station and Bayview Subdivision is connected to the 24-inch diameter sewer prior to the treatment plant overflow chamber. The design capacity of the RCA Limited sewer is 12.1 cfs. At a normal maximum day flow rate of 150 IGPM from the RCA Limited pumping station and a sewage flow of 15,906 GPD from Bayview Subdivision, the flow to the 24-inch diameter plant inlet sewer from the RCA Limited sanitary sewer would be 231,900 GPD.

Therefore the total peak flow to the sewage treatment plant overflow chamber would be approximately 7,241,900 GPD. The overflow chamber is designed such that all flows in excess of 4 x dry weather flow or 5.0 MGD will bypass to the sewage treatment plant outfall sewer. In this case a total of 2,242,000 GPD or 1,550 GPM would overflow to Midland Bay.

During peak flows, overflows will occur at storm overflow chambers A, B and C prior to an overflow at the sewage treatment plant.

Appendix L of the report gives the summaries of the precipitation in 1970 and 1971 and the average daily runoff to the combined sewers in 1970.

E. Nutrient Control

Under the auspices of the International Joint Commission intensive water quality studies of the Lower Great Lakes and connecting rivers have been carried out by both the Federal Government, Ontario and bordering States. From these studies it was concluded that phosphorus was the significant element in the occurrence of nutrient enrichment or eutrophication problems in our lakes and streams. As a result the International Joint Commission recommended that the amount of phosphorus discharged from all sources including detergents and agricultural sources should be reduced to the lowest practical level.

A target date of 1975 for phosphorus removal facilities at municipal sewage treatment plants was recommended by the International Joint Committee. The OWRC having also studied many of the inland recreational waters, portions of Lake Huron and other lakes and rivers to investigate the extent of enrichment problems has recognized that there are areas where nutrient removal facilities are more urgently required and will have to be installed in advance of the 1975 target date. It was established that plants on portions of Georgian Bay, 1.0 MGD and greater or where smaller plants have lead to local nuisance conditions will have facilities by December 31, 1973. A study of Midland - Penetang Bay Area by the OWRC, Division of Laboratories, showed indications that this area was highly enriched.

Therefore, nutrient removal facilities will be required at the Midland water pollution control plant by December 31, 1973.

F. Future Requirements

The Town of Midland storm water separation and sewage works program which was initiated in 1964 is included in Appendix M. The municipality has scheduled for 1974 to upgrade the water pollution control plant by providing secondary treatment.

As stated previously nutrient removal facilities will have to be installed and in operation by December 31, 1973. This project will have to be incorporated in the sewage works program and may offset the current scheduling.

Although satisfactory waste treatment is being provided at the water pollution control plant, the plant is hydraulically overloaded and consideration should be given to plant expansion.

VII WATER POLLUTION SURVEYS

A. 1966 - Water Pollution Survey

(i) Summary

A water pollution survey was conducted in the Town of Midland in 1966 to assess the water quality conditions within the municipality. It was found that the surface water quality conditions were generally satisfactory; however, a number of pollution sources were sighted from sanitary and industrial waste outfalls. The most significant were the industrial waste discharges from Pillsbury Canada Limited and Decor Metal Products. At the time of the survey, water pollution control studies were underway at these industries to eliminate contaminating waste discharges to Midland Bay.

Direct sanitary waste discharges were found from the following premises: Great Lakes Boat and Machine Company, Midland Grain Elevator, Midland - Aberdeen Elevator Company, Tiffin Elevator Company and also the public washrooms and a snack bar at the main docks.

Also it was noted that there was a varying degree of contamination evident in each of the municipal storm sewer discharges and it was anticipated that with the municipality's sewer separation program, the quality of the storm discharges would improve.

(ii) Recommendations

The following recommendations were made as a result of the 1966 water pollution survey:

1. Pillsbury Canada Limited should continue its program of establishing satisfactory industrial waste disposal measures.

2. Decor Industries should continue its efforts to provide adequate industrial waste disposal facilities.

3. Sanitary waste outfalls to Midland Bay from the previously mentioned premises should be eliminated.

4. The program of separating storm and sanitary waste flows should be accelerated as much as possible.

5. Provision should be made for the satisfactory disposal of wastes from boats docked at the Midland harbour as already proposed by the municipality.

(iii) Action Taken on 1966 Recommendations

1. Facilities to direct sanitary sewage and industrial wastes to the municipal sanitary sewer were completed in the fall of 1967. Storm water which discharged to the sanitary sewer was separated and diverted to Midland Bay in the summer of 1968.

2. Under the recommendations of the OWRC, Division of Industrial Wastes, Decor Metal Products installed water pollution control facilities.

3. Midland Great Lakes Boat and Machine Company - a holding tank and pumpout facility was installed to contain sewage wastes at this site; wastes are then trucked to the Midland water pollution control plant.

   Midland Grain Elevator - domestic wastes are now being directed to the municipal sanitary sewers.

   Midland - Aberdeen Elevator Company - a septic tank and tile bed system was installed; however, the company has since closed down.

   Tiffin Elevator Company - a septic tank and tile bed system was installed.

   Public washrooms - the municipality closed down these washroom facilities.

   Snack bar - this snack bar known as Pop's Inn utilizes a holding tank to contain sink wastes; the wastes are then hauled away.

4. The Town of Midland has a storm water separation and associated sewage works program. An outline of the sewer separation and extension program is found in Appendix M.

5. There are approximately 3 boat waste pumpout facilities in the harbour at present.

B. 1970 - Little Lake Survey

In September, 1970, the Simcoe County Health Unit posted Little Lake as being polluted and unsafe for swimming as a result of an increasing deterioration of the bacteriological water quality of the lake throughout the summer. An excessive bacteriological count following a heavy storm runoff in September culminated the situation which brought about the posting.

A preliminary pollution investigation was made by the OWRC in conjunction with the Simcoe County Health Unit to determine the cause of contamination of Little Lake and to locate the source of contaminants.

On September 24, 1970 samples were collected from the two municipal storm sewer outfalls to Little Lake during a heavy rainfall. The results indicated that sewage wastes were gaining access to the two storm sewers and discharging to Little Lake. A comparison of bacteriological samples taken before and after storm sewer flow on September 24, 1970 indicated the bacteriological water quality had deteriorated as a result of the discharge from the storm sewer and possibly from stirred-up sediments from the lake bottom.

An attempt was made to locate the source of the sanitary waste discharges to the storm sewers. It was suspected that an area served by septic tank systems on Noreen Street was causing the contamination of the storm discharge from the storm sewer on the west side of the lake; however, no conclusive evidence was found. The source of contamination from the storm sewer at the beach was not found either.

Further suspicions were thrown on the cottage and camping areas on the perimeter of the lake in which overcrowding of the recreational area occurs and in which seepage from septic tank systems could be gaining access to Little Lake.

It was then decided that a monthly bacteriological sampling program of Little Lake would commence in January of 1971 and continue through the summer in order to assess the water quality during increased recreational use to ascertain exactly the cause of pollution.

C. 1971 - Water Pollution Survey

A water pollution survey was conducted in 1971 in which special emphasis was placed on Little Lake due to the municipality's concern for the coming summer recreational use of the lake. Sources of pollution found in the 1966 water pollution survey were also investigated to determine if the sources of contamination had been corrected and eliminated. Also, the municipal storm sewer outfalls were investigated and where a discharge was found samples were collected and the results discussed.

(i) Little Lake

Little Lake is a spring-fed lake located within the municipal boundaries of the Town of Midland. In the 1966 OWRC water pollution survey, the lake was reported to be about 1.25 miles long and 0.67 miles wide and is approximately 13 feet deep at its deepest point. The lake level may be controlled by a weir system which allows the overflow to drain to the William Street storm sewer.

The Midland Parks Commission operates a large park and beach area on the lake as well as a number of cottages and trailer camp sites. Sanitary wastes from the Midland Park area is directed to the municipal sanitary sewer. There are two other cottage and trailer camping sites on the lake also. A 40-acre parcel of land owned by Mr. Sam Smith, contains about 100, 1 and 2-bedroom cottages along with 24 permanent mobile homes and an area of summer trailers. Water for drinking and washing purposes is obtained from the municipal water supply. Water for flush toilets is pumped from Little Lake. Domestic wastes are pumped to two large septic tank and tile bed systems. Another property is leased from the municipality by a Mr. W. Taylor and accommodates 15, 1-bedroom cabins, 10 trailers and 4 tents. Water is obtained from a well supply on the site. Sanitary wastes disposal facilities consist of two pit privies. Also, there are a number of private cottages on the lake.

The investigation of Little Lake brought about by the swimming ban was to determine whether seepage from septic tank systems adjacent to the lake, contaminating discharges from storm sewers, or overcrowding of the recreational facilities was the source or reason of contamination of the beach area of Little Lake.

The results of the monthly bacteriological sampling program of Little Lake conducted in co-operation with the municipality and the Simcoe County Health Unit are found in Appendix N, Table 1. The results show that the bacteriological water quality of Little Lake was generally satisfactory.

During dry weather conditions the two municipal storm sewers outfalling to Little Lake do not have any discharge. However, during rainfall and runoff periods there is discharge to the lake. Chemical analyses of samples of the discharges have shown high biochemical oxygen demands and suspended solids concentrations along with ABS concentrations indicating detergents. Also, extremely high coliform counts were obtained. These results substantiate the findings in 1970 that domestic wastes were gaining access to the storm sewers. The concentration of domestic wastes in the storm sewers would probably vary with the intensity of the runoff due to rainfall or spring snow melt. Table 2 of Appendix N contains the laboratory results of samples collected from the storm sewers.

The effect of the storm sewer discharges on the chemical water quality of Little Lake, especially at the public beach is shown in Table 3. Chemical samples collected from Little Lake opposite the No. 1 storm sewer at the beach on March 16, 1971, during a spring runoff show a very high BOD and suspended solids concentration as compared to the normal water quality of the lake as shown in samples collected west or upstream from the storm sewer.

A bacteriological sample shown in Table 4 of Appendix N collected on September 29, 1971, from the beach area downstream from the No. 1 storm sewer

during a discharge revealed high total coliform and faecal coliform counts which would render the Little Lake beach questionable for swimming purposes.

With high suspended solids concentrations and BOD being discharged to the beach, there is bound to be some contaminants settling to the lake bottom where decomposition would take place thereby deteriorating the water quality by utilizing the dissolved oxygen in the water. During any wave action or disturbance these sediments would be displaced from the bottom and dispersed in the lake water. If the lake were to be sampled close to the shore during these periods for bacteriological examination, high coliform counts would likely show up.

It is therefore concluded that during and following storm runoff periods, Little Lake near the beach area would quite likely be unsuitable for swimming purposes.

(ii) Municipal Storm Sewer System

Surface runoff is directed by a system of storm sewers and also combined sewers to Georgian Bay with the overflow from Little Lake draining to the William Street storm sewer. Samples of the discharges from the storm sewers were collected for chemical analyses and bacteriological examination. The chemical analyses performed on samples were BOD_5, total, suspended, and dissolved solids, ABS for detergents, nitrogen and phosphorus, phenols and ether solubles. Bacteriological examination was made for total coliform bacteria, faecal coliforms and faecal streptococcus.

The Town of Midland By-Law No. 2742, which was modelled after the OWRC's suggested by-law, regulates the discharge of water and wastes in the Town of Midland public sewers. Article 3 of the by-law outlines the criteria for storm sewer use and states that no person shall discharge, directly or indirectly, to any storm sewer or storm sewer connection any of the following:

(a) Gasoline, benzene, naptha, fuel oil, or other inflammable or explosive matter.

(b) Any matter containing suspended solids exceeding twenty (20) parts per million or which are incapable of passing through a quarter-inch screen.

(c) Any matter in which the BOD exceeds twenty (20) parts per million.

(d) Any matter containing a phenol concentration in excess of 20 ppb.

(e) Any matter in which the median coliform count exceeds 2,400 per 100 ml (the above represents only a portion of Article 3, Storm Sewer Use).

Since the by-law was adopted in 1967, the OWRC has updated its micro-biological criteria to read in part......"where ingestion is probable, recreational waters can be considered impaired when the coliform, faecal coliform, and/or enterococcus geometric mean density exceeds 1,000, 100 and/or 20 per 100 ml respectively, in a series of at least ten samples per month including samples collected during weekend periods." The chemical and micro-biological criteria as set out in the municipal by-law No. 2742 will be used for interpreting the sample results. The results of samples collected from the storm sewers and drainage ditches are included in Appendix O.

Woodland Drive Storm Sewer (M-4W)

Samples were collected at the outfall of this storm sewer on the north side of Vindin Street. On four occasions, bacteriological examination showed extremely high total coliform counts of 266,000; 270,000; 680,000 and 690,000. Also the faecal coliform counts were high at 30,000; 60,000; 2,000 and 10,000. These high counts are indicative of domestic sewage. Chemical analyses of a sample collected in October revealed a suspended solids concentration of 75 ppm and a BOD of 480 ppm above the by-law limits. Also the phenol concentration was above the limit. It is noted that drainage from the storm sewer flows toward the municipal spring reservoir.

Vindin Street Drainage Ditch (M-4D)

A drainage ditch located on the south side of Vindin Street opposite the Woodland Street storm sewer outfall was sampled during the spring and the results were satisfactory. Flow in this ditch is intermittent depending on runoff periods.

Sixth Street Drainage Ditch (M-2D)

This ditch is located on the west side of Sixth Street, south of Vindin Street. Flow was only noticeable in the ditch during the spring at which time drainage from a construction storage area was gaining access to the ditch. A coliform count of 5,500 was obtained in May and was throught to be from this

construction area. The area has since been cleaned up and no fruther problems exist.

Sixth Street Storm Sewer (M-3W)

This storm sewer was sampled at the outfall on the east side of Fifth Street, north of Vindin Street. Bacteriological examination of a discharge showed high total coliform bacteria and faecal coliform counts on three occasions indicating domestic sewage was gaining access to the storm sewer. The total coliform bacteria counts were 36,000, 76,000, and 180,000; the respective faecal coliform counts were 28,000, 1,800 and less than 10. On the fourth sampling of the discharge, total coliform bacteria and faecal coliform counts of 530 and less than 10 were found; this was somewhat lower than on previous occasions and it could be that the discharge of domestic sewage to the storm sewer is intermittent. Also at the time of sampling, there was an oil slick on the surface of the storm sewer discharge. The source of the oil is probably from service stations in the area.

Storm Sewer at Vindin & Fourth Streets (M-4W)

This storm sewer outfall is located approximately north-east of the point where Vindin and Fourth streets coincide. No flow was noted from the storm sewer.

Fourth Street Storm Sewer (M-6W)

This storm sewer was sampled at the outfall located east of Fourth Street at the bottom of Quebec Street. The bacteriological examination of four samples collected indicated that domestic sewage was also gaining access to this storm sewer. The total coliform bacteria counts were 19,200; 640,000; 240,000 and 82,000. The relative faecal coliform counts were 7,600; 110,000; 1,650 and 4,700.

First Street Storm Sewer (M-11W)

This storm sewer was sampled at a catch basin on the north side of Bay Street at the bottom of First Street. Total coliform bacteria counts of 550,000, 130,000 and 56,000 were obtained along with respective faecal coliform counts of 32,000, 340 and 3,200. These high coliform counts indicate that domestic sewage is gaining access to the storm sewer.

King Street Storm Sewer (M-10W)

This storm sewer was sampled at a catch basin on the east side of King Street south of the railway crossing at the bottom of King Street. The catch basin was inspected on three occasions. The sample results did not show any significant pollution although the one bacteriological sample result available indicated a total coliform count of 4,300. In October there was insufficient flow in the storm sewer for sampling purposes.

Midland Avenue and Gloucester Street Storm Sewers (M-8W)

The combined flow from the storm sewers was sampled three times at a catch basin located immediately west of the CNR express office. Bacteriological examination of these samples revealed that domestic sewage was gaining access to either storm sewer or both storm sewers. The total coliform bacteria counts were as follows: 89,000; 51,000; 450,000. The respective faecal coliform counts were 20,000; 6,000 and 2,000.

During road construction in the area, the Gloucester Street storm sewer was directed to a catch basin on the north-west corner of the intersection of Bay Street and Midland Avenue. Here, the combined flow of Midland and Gloucester storm sewers were sampled in October. Chemical analyses revealed an extremely high BOD and suspended solids concentration of 140 ppm and 850 ppm respectively, above

the limit set out in the sewer use by-law. Also, the phenol concentration was above the by-law limit. Bacteriological examination again showed excessive total coliform bacteria and faecal coliform counts of 16,000 and less than 1,000 respectively, substantiating that domestic sewage was being directed to the storm sewers.

Storm Sewer at Manley Street (M-12W)

A storm sewer located at the north end of Manley Street serving the new roadway had no discharge to Midland Bay.

William Street Storm Sewer (MB-1W)

Bacteriological examination and chemical analyses of samples collected from this storm sewer at a manhole near Frank Street revealed the discharge to be satisfactory with no contamination.

Bayview Heights Subdivision Storm Sewer (M-9W)

The outfall of this storm sewer is located west of Birchwood Drive. A discharge from the storm sewer was noted only once; chemical analyses and bacteriological examination did not reveal any evidence of pollution.

(iii) Industrial Waste Disposal

(a) Decor Metal Products Limited

Decor Metal Products Limited operates a large modern plating and manufacturing plant on the shore of Midland Bay. The plant manufactures name plates, crests, dials, decorative metal trim and automobile safety seat belt buckles. Raw materials used at the plant include glass, steel and aluminium. There are approximately 275 people employed over a 17-24 hour day.

Two sources of water supply are used: approximately 27,000 GPD are obtained from the Midland Public Utilities Commission and in addition, an estimated 800,000 GPD of raw water are pumped from Midland Bay via two centrifugal pumps rated at 450 GPM each.

In a 1965 OWRC Industrial Waste Survey it was found that all industrial wastes were directed to Midland Bay. Domestic wastes were being discharged to a storm sewer outfalling to Midland Bay. Chemical analyses indicated that the industrial waste effluents were unsatisfactory in which the cyanide, chromium, suspended solids and nickel concentrations in certain plant flows exceeded OWRC objectives for discharge to a watercourse. The OWRC Division of Industrial Wastes recommended that pretreatment facilities be installed at the plant to treat the industrial wastes which would then be discharged to the municipal sanitary sewer system. Also, it was recommended that the domestic wastes be discharged to the sanitary sewer.

In complying with the OWRC recommendations, Decor Metal Products Limited installed pretreatment facilities and separated contaminated waste flows from other plant flows for treatment in the new facilities. Effluents from the treatment units are now discharged along with domestic wastes to the municipal sanitary sewer. The flows to the sanitary sewer consists of 4,000 GPD of domestic sewage and approximately 210,000 GPD of industrial wastes.

Investigations by the Ministry's Industrial Wastes Branch have indicated that concentrations of suspended solids, ether solubles and nickel in the plant effluent are sometimes in excess of the limits set out in the Municipal Sewer Use By-law #2742. Every effort should be made by Decor Metal Products in conjunction with the Industrial Wastes Branch and the Town of Midland to ensure the waste discharges from the plant meet the limitations as in the Municipal Sewer

Use By-law No. 2742.

During the water pollution survey on October 27, 1971 a chemical sample was collected from Midland Bay at the mouth of an 8-inch outfall sewer from Decor Metals where small white particles appeared to be discharging from that sewer. Chemical analyses indicated that the material was typical of that of vegetable oil. The laboratory results are found in Appendix O, Table 2. The source of discharge has since been investigated and the substance has been eliminated from the discharge to Midland Bay.

(b) RCA Limited

RCA Limited, Electronic Components Division, manufactures picture tubes for color television sets. Approximately 800 people are employed on a 3-shift basis.

Water used for domestic and industrial purposes at the plant is obtained from the company-owned water works. Water flows by gravity from Midland Bay to a low lift pumping station via an 18-inch diameter intake. The water is then pumped and chlorinated to a filtration plant consisting of two diatomaceous earth filters; approximately 500,000 GPD are pumped daily from Midland Bay for inplant use.

Plant waste discharges consist of sanitary wastes, cooling water wastes and process wastes. Sanitary wastes estimated at 15,000 GPD are directed to the municipal sewage treatment plant. Cooling water is discharged directly to the Wye River without treatment at an approximate flow of 285,000 GPD. Process wastes which are highly acidic and caustic in nature are pretreated in neutralization

basins. From the neutralization basins, the waste flows to a lagoon system for sedimentation of the lime sludge. The lagoon effluent is then filtered and discharged to the Wye River. The estimated pretreated waste flow is 200,000 GPD.

RCA Limited has worked closely with the Ministry's Industrial Wastes Branch in maintaining satisfactory waste discharges with respect to suspended solids concentrations and pH control. In addition, a fluoride removal system has been installed to lower the fluoride concentration in the waste discharge.

(c) Bay Mills Limited

Bay Mills Limited produces decorative and industrial fabrics mainly from fibreglas. There are approximately 230 people employed at the plant over three 8 - hour shifts, 5 days per week. In 1970, the average daily water consumption was approximately 45,800 gallons; over a five day work week this consumption figure would be 640,000 GPD. A recent water consumption figure was given at 2,000,000 gallons per month or 65,600 GPD (7-day week) or 87,000 GPD (5-day week).

It is estimated that 10 per cent of the water or 4,580 gallons (1970) is used for sanitary facilities with the wastes being discharged to the municipal sanitary sewer. Other discharges to the sanitary sewer include dye solutions from "Padder" tanks. Surplus solutions are dumped into a settling and holding tank and then pumped to the sanitary sewer system. There are four discharges weighing between 200 - 250 lbs. each during the working day. Also, a discharge of polyvinyl alcohol solution is directed to the sanitary sewer twice a week at

approximately 350 lbs. a discharge. In addition, an industrial chrome finish solution weighing 150 lbs. is discharged to the sanitary sewer.

Cooling water from the yarn cooler is directed to the storm sewer system along with roof drainage.

It is not known whether the individual discharges from Bay Mills Limited to the sanitary sewer are in compliance with the Municipal Sewer Use By-Law No. 2742. However, on October 27, 1971, a sample of what appeared to be a blue dye solution was collected from the sanitary sewer from Bay Mills Limited. Chemical analyses revealed a 5-day BOD of 1,000 ppm exceeding the by-law limit of 300 ppm. Also the suspended solids concentration of 710 ppm was above the limit of 350 ppm as set in the by-law. The results are found in Table 2 of Appendix O.

The concentration of the dye solution was such that the municipal sewage treatment plant effluent was completely the same color as that of the dye. The colored effluent was noticed in the bay as it emerged from the plant outfall. Depending on the colour of the dye, this would at times be aesthetically unsatisfactory; a red or yellow dye would discolour the bay water at the point of discharge of the final plant effluent.

A sample of the final plant effluent showed a BOD concentration which was approximately 30 ppm greater than the average BOD in the effluent. The sample results are shown in Appendix O, Table 2.

(d) Dominion Electroplating Limited

Dominion Electroplating Limited is engaged in copper, nickel, chromium and zinc plating of automotive parts. A manually-operated copper, nickel, and chromium plating line is used to plate car antenna tubes. Also a barrel zinc line is used to plate parts of seat belt buckles.

There are 7 people including the owner working at the plant on 1 1/2 shifts per day, 5 days a week. Two water supplies are utilized at the plant: the municipal water supply and a company-owned drilled well supply. The municipal water supply is used predominantly for sanitary facilities at the plant; approximately 1,600 gallons were utilized in 1970. The 300-foot drilled well serves for industrial purposes and the water is chiefly used for plating wash water; approximately 12,000 gallons per day are utilized and discharged to the municipal sanitary sewer.

Chromium plating process water is directed to a settling tank for pretreatment of chromium. Chromium wastes are put into barrels and disposed at the municipal sanitary landfill site. There have been problems at times with the discharges containing metal concentrations in excess of the limits set out in the Municipal Sewer Use By-law. The Ministry's Industrial Wastes Branch with the co-operation of the municipality has maintained surveillance of the industry and has made recommendations regarding treatment facilities to ensure proper waste discharges.

(e) Day Specialities Company (Daysco) Limited

Daysco Limited manufactures plastic backgrounds for electric ranges and other applicances. A total of 43 people are employed at the plant over two shifts per day. Water for sanitary and industrial purposes is obtained from

the municipal water supply. According to 1970 PUC records, approximately 3,000 GPD are utilized.

Sanitary wastes are directed to a septic tank system which was installed to serve 500 people.

Water for industrial purposes is used as a coolant and lubricant as it passes through diamond-drilled cores. The water picks up silica sand in the process and discharges into small settling basins in the plant. The wastewater then is directed to an excavated pit filled with 2-inch crushed stone. The capacity of the subsurface pit is approximately 1000 cubic feet. It was anticipated that suspended solids in the discharge would be retained in the pit.

On October 27, 1971, a sample was collected of the discharge from the subsurface pit and chemical analyses showed a suspended solids concentration of 50 ppm. Chemical analyses are shown in Table 2 of Appendix O. At the time of sampling, the discharge was warm indicating possibly that very little retention is offered in the pit and consequently very little settling occurs.

The problem has since been investigated and the discharge has now been blocked.

(iv) <u>Refuse Disposal</u>

The sanitary landfill site is located in the south-western part of Lot 12, Concession 9, in the Township of Tiny. The operation of the landfill site does not appear to be creating a water pollution problem.

D. Water Quality of Midland Bay

In 1971, a summary report on the water quality conditions in the Penetang to Waubaushene area of Georgian Bay was published by the OWRC Division of Laboratories. The summary report is based on data collected in 1969 and as conditions have not changed significantly since then the information provided in the report would be representative of present conditions.

The results indicated that the water quality throughout the study area was generally satisfactory. However, there were two areas, one of which was Midland Bay, that were over-enriched and at times Midland Bay itself showed evidence of algal blooms. Phosphorus inputs from municipal sources have been cited as being responsible for the over-enrichment of Penetang Harbour and Midland Bay.

The report indicated that Midland's municipal sewage effluent is the largest net contributor of phosphorus (48 per cent) to the area between Penetang Harbour and the Severn River, and the second largest contributor of nitrogen (16 per cent). The Wye River contributes 10 per cent and 12 per cent respectively of the phosphorus and nitrogen entering the area. The total phosphorus concentration throughout most of the study area was 0.02 ppm; however, in Midland Bay the phosphorus concentration was 0.03 ppm.

Evidence of enrichment in the Penetang - Waubaushene area was also noted as the phytoplankton mean concentration throughout the study area was higher than the level found in Lake Huron - Georgian Bay proper. Average summer concentration of phytoplankton were troublesome only in Penetang Harbour; however,

fall blooms of blue-green algae were prevalent in both Penetang Harbour and Midland Bay. Algal blooms have been noticeable in the past few years in Midland Bay indicating the nutrients have just recently reached nuisance levels in the Midland area. The other algal problem described in the report was growths of the filamentous green alga, Cladophora, which grew quite abundantly in the vicinity of the Midland sewage treatment plant outfall.

The report concludes that every effort should be made to curb further inputs of nutrients, particularly phosphorus, to the Penetang - Waubaushene area of Georgian Bay. It is anticipated that with the installation of phosphorus removal facilities at Penetang and Midland, the water quality should improve significantly.

The bacteriological sampling of the study area indicated that the bacteriological water quality conditions were generally satisfactory throughout most of the area. However, in Penetang Harbour the total coliform and faecal coliform counts sometimes exceeded the OWRC criteria for recreational waters. In Midland Bay the counts were much lower and seldom exceeded the OWRC criteria except in the immediate vicinity of the sewage treatment plant outfall. The report concluded that increased attention to the monitoring of bacterial conditions at public beaches in Penetang Harbour and Midland Bay should be warranted during the summer swimming season.

A bacteriological water quality survey of Midland Bay and Wye River was conducted by the Simcoe County Health Unit in June, 1971 and the results indicated the bacteriological water quality was satisfactory at the time of the sampling. Also, bacteriological examination of samples collected during the OWRC water pollution survey in October, 1971 showed the bacteriological water

quality to be generally satisfactory. The bacteriological sample results of the surveys are shown in Appendix P, Tables 1 and 2.

As the Town of Midland is served by a system of combined and separate sewers, raw sewage bypassing to Midland Bay occurs during periods of heavy rainfall or high runoff. At these times, sewage overflows may affect the bacteriological water quality in Midland Bay. Also, raw sewage being bypassed is a source of phosphorus input to the Bay.

During the spring of 1971, oil slicks were noticeable around the dock area in the vicinity of the Canada Steamship office and at the foot of King Street. Chemical samples were collected of the oil and spectroscopic analyses of the samples indicated that the main constituent was a furnace fuel oil. A chemical sample collected from a manhole to the storm chamber A outfall in front of Downer's Marina also indicated a furnace fuel oil. The source of the discharge of oil to the bay could not be determined. However, an effort was made by the town to remove the oil slick from the bay by pumping to a liquid haulage tank.

Appendix Q, Table 1 of the report shows the results of the oil samples. Table 2 contains the chemical results of water samples from the Wye River.

VIII MUNICIPAL DEVELOPMENT

A. Tiny - Tay Peninsula Planning Area

The Tiny - Tay Peninsula Planning Area includes the Towns of Midland

and Penetanguishene, the Villages of Port McNicoll and Victoria Harbour, and the Townships of Tay and Tiny with the Town of Midland as the designated municipality for the joint planning area. The planning area was approved by the Minister of Municipal Affairs in October 1971 and came into effect on November 4, 1971.

The Planning Area will be administered by a planning board which will carry out an effective planning program leading to the preparation of an Official Plan covering the entire area. The Official Plan will state the general development policy for the municipalities in the area. At the time of the inception of the Planning Area, the municipalities of Midland, Penetanguishene and Tay Township had Official Plans approved by the Minister of Municipal Affairs.

In 1971 the Province of Ontario released a report "Design for Development : The Toronto-Centred Region" describing the Province's basic considerations and objectives for the orderly growth and development of the Toronto-Centred Region. A major part of the development strategy for the Toronto-Centred Region is the stimulation of two growth areas within easy access of Metropolitan Toronto but beyond commuting range. One of the growth areas selected was to the north in the vicinity of Barrie and Midland and was considered because of the rapid urbanization and industrial growth on Lake Simcoe and the southern Georgian Bay area and the effects of municipal and industrial wastes would have on the recreational facilities of Lake Simcoe and Georgian Bay.

The six municipalities of the Tiny - Tay Peninsula Planning Area had been working together prior to the government report and have agreed to the principle of area planning.

In light of rapid urbanization and industrialization, the Tiny - Tay Peninsula Planning Area is concerned that unplanned and unstaged development will occur resulting in misuse of land and piecemeal or substandard servicing of areas unless the Planning Area has the legislation to control development and the finances to provide full municipal services. In its brief to the Ontario Government in regard to the report, "Design for Development: Toronto-Centred Region," the Planning Area expressed that it is prepared to co-operate fully provided that Provincial assistance is given. In the area of water resource development, the Planning Area requested the Province to direct the Ontario Water Resources Commission in conjunction with the municipal consultants, to:

(a) Carry out a hydrographic survey immediately to establish the water flow in that part of Georgian Bay bounded by the municipalities so as to ensure that the body of water in this area will not be deteriorated further by discharge of effluent, both from this area and the Trent-Severn-Couchiching-Lake Simcoe watersheds.

(b) Consolidate all water supply studies in this area with a view to an area water supply.

(c) Advise on the municipalities present facilities for sewage disposal and their capacity and efficiency for enlargement; and draw up a staged plan for sewage collection and treatment throughout the area as it develops.

Independent of the above requests, the OWRC did do similar studies in this regard and comments are made later in the report under the heading, Discussion.

B. Subdivision Development

To ensure that any subdivision developed within municipal boundaries is provided with adequate water and sewage services and to prevent numerous water and sewage systems, the Town of Midland enacted By-law No. 2954 which provides for a form of agreement for the supplying of services by subdividers. Before the municipality approves of a plan of subdivision, each subdivider of land within the municipality must undertake and agree to supplying all municipal services at the subdivider's own expense.

There are a number of proposed and approved subdivisions which are presently being developed or will eventually be developed within the municipality. The following is a summary of present and future development in the town with the estimated water and sewage flow capacities.

Bayview Subdivision - This approved subdivision consists of 244 lots of which 158 lots are still to be developed representing an expected future population of 553. Water requirements using the actual maximum day factor of 1.8 at 87.5 GPCD in 1970 would be 87,000 GPD or 60 GPM. The ultimate average daily sewage flow to the plant using a design flow of 100 gpcd would be 55,300 GPD.

Hugel Heights Subdivision - This subdivision which has been approved consists of 374 lots (90.7 acres) of single family dwellings and 2 blocks (11.3 acres) for multiple family dwellings of which there are 322 single family lots and the 2 block areas remaining to be developed. The expected additional population from the undeveloped area is estimated at 2,100. The maximum day water requirement would be 330,000 GPD or 230 GPM. The additional average daily sewage flow to the

plant would be 210,000 GPD. The ultimate sanitary sewer contribution from the entire subdivision was estimated at 650,000 GPD for sewer design purposes.

Lakeview Subdivision - Lakeview Subdivision which also has been approved will consist of 79 lots with an expected future population of 276. Maximum day water usage is estimated at 43,500 GPD or 30 GPM and the expected sewage flow would be 27,600 GPD.

Huron Park Subdivision - This proposed subdivision, although not approved as yet, will consist of 133 lots requiring a water flow of 73,500 GPD or 51 GPM for an expected population of 466. Sewage flow would be 46,600 GPD.

There has also been two other proposed plans of subdivision for the Town of Midland. One plan calls for 71 lots of single family dwellings and 7.1 acres provided for townhousing representing an equivalent population of approximately 532. Maximum day water consumption would be 83,600 GPD or 58 GPM. The average daily sewage flow would be 53,200 GPD, the maximum design flow for the sanitary sewers is 258,000 GPD. The other plan of subdivision to be located partly in the Township of Tay consists of 16 lots for medium industrial use; water and sewage flows are not known.

A district hospital and school are also planned for the area to be located adjacent to the Town of Midland, west of Hugel Avenue, in the Township of Tiny. The hospital is to be developed in three stages. The first stage will provide for 125 beds, the average daily water usage is expected to be 48,000 GPD with a probable maximum consumption of 86,400 GPD or 60 GPM; the design sewage

flow will be .32 cfs (173,000 GPD). The average daily water consumption after the second stage of development is expected to be 90,000 GPD with a probable maximum of 162,000 GPD or 113 GPM; the design sewage flow is .66 cfs or 355,000 GPD. On completion of the third stage, the hospital will have 600 beds. The expected average daily water consumption will be 150,000 GPD with a maximum daily demand of 270,000 GPD or 188 GPM; the design sewage flow is 595,000 GPD.

The new school will probably have an average daily water usage of 18,000 GPD at a maximum of 32,400 GPD or 22 GPM. The design sewage flow is .13 cfs or 70,000 GPD.

Therefore, taking into consideration that all of the approved subdivisions will eventually be developed along with the school and the first stage of the hospital, the additional water pumpage required will be 402 GPM on a maximum day basis. The probable average daily sewage flow would be 385,100 GPD. If the subdivisions, not approved as yet, are included the total maximum day water pumpage required would be 640 GPM with an average daily expected sewage flow of 625,000 GPD.

Appendix R, shows the number of serviced and unserviced lots as of 1970.

IX DISCUSSION

As revealed in the Province of Ontario's report "Design for Development: The Toronto-Centred Region", the Midland area was selected as one area for growth stimulization due to its present and potential rapid urbanization and industrialization and the effects that municipal and industrial wastes would

have on the recreational facilities of southern Georgian Bay. The Tiny - Tay Peninsula Planning Area with Midland being the axis of the Planning Area realize the inevitability of rapid development and have expressed concern that unless the Planning Area has the legislation to control development, unstaged development and piecemeal or substandard servicing of areas will occur.

Disregard for staged development in the area can already be observed with development occurring immediately adjacent to the Town of Midland to the north and west. To the north in the Township of Tay, two subdivisions have so far been developed and to the west in Tiny Township, a number of commercial establishments have been developed. Developers are attracted to township lands close to the urban centre as full municipal services are not required since there are no such services available in the township; whereas in the Town of Midland, the subdividers must agree to provide full municipal services. Consequently, areas in the Town of Midland are being ignored or are being developed at a slower pace. This essentially is opposite to the strategy of the Province in that any natural growth that takes place should be encouraged into existing urban communities where full municipal services are provided.

If development of adjacent township lands is allowed to continue, the Town of Midland will be completely enveloped by a built-up area serviced by numerous water works systems utilizing ground water supplies and by septic tank and subsurface tile bed systems for sewage disposal. Meanwhile, within the Midland boundaries, development will remain slow and consequently, there will be little demand for extension of municipal services and expansion of the municipal water works and sewage works systems will be on a small scale.

It is inevitable that municipal services from the town will eventually be extended to the township and existing adjacent development in the township will probably be required to connect to the Midland municipal services as these services are extended beyond the existing development.

As pointed out by the Tiny - Tay Peninsula Planning Area, control of development is not imminent unless legislation is passed by the Ontario Government giving the Planning Area jurisdiction over control of development. Also if it is the scheme of the Ontario Government to encourage development in the Midland area, financial assistance should be given for planning studies and subsequent servicing. The municipalities alone would not be able to finance such projects.

The Planning Area in its brief to the Ontario Government requested that all water supplies in the area be consolidated with a view to an area water supply. A design report based on a 20-year design was prepared for the Town of Midland on a water treatment plant and a system of trunk mains and storage facilities utilizing Georgian Bay as the source of supply. However, the municipality rejected the scheme due to financial reasons and presently seem to be developing well supplies piecemeal. In one aspect this reasoning seems to be justified on a short-term basis as development within the municipality is slow and economically the municipality is able to finance small projects. However, some time in the future, the well supplies will become exhausted and a lake water supply will have to be developed to meet water requirements for the area. The Town of Midland along with the Tiny - Tay Peninsula Planning Area should therefore strive to achieve development of a surface water supply from Georgian Bay in order to meet the expected future requirements.

Presently the municipality is developing an additional well supply which should bring the water supply up to present day minimum requirements. However, to meet future demands again another well will have to be developed.

Also in its brief, the Planning Area requested that a hydrographic survey of southern Georgian Bay be conducted to determine present water quality conditions and to protect the water quality from further deterioration from effluent discharges. A water quality study was performed by the OWRC in 1969 and the results indicated that the water quality was generally satisfactory; however, there were two areas where over-enrichment was in evidence. One area was Midland Bay and phosphorus input from municipal sources was cited as being responsible for the enrichment of the bay. It was concluded from the results that every effort should be made to curb further inputs of nutrients particularly phosphorus to this portion of Georgian Bay.

Nutrient removal facilities will be required at the Midland Water Pollution Control Plant by December 31, 1972 which will provide for the removal of phosphorus. Plant studies have already been initiated by the Research Branch of the Ministry of the Environment. However, phosphorus input to Midland Bay will still originate from the municipal sewer system. The sewage collection system consists of combined and separate sewers in which surface runoff is directed to the combined sewers along with domestic wastes. During heavy runoff periods sewage overflows occur at the storm overflow chambers as the sewage pumping stations can only handle a certain amount of sewage flow and any flow in excess of this discharges to Midland Bay. As estimated in the report, these overflows could at times be quite excessive and the municipality should give priority

to its sewer separation program. Also the municipality should investigate the possibilities of increased sewage flow from premises utilizing private water supplies. The sewage treatment plant is hydraulically overloaded and plant expansion is required.

The sample results of the water pollution survey indicated that domestic wastes were gaining access to the municipal storm sewer system. Illegal connections to the storm sewers should be located and eliminated. Particular concern should be given to the storm sewers outfalling to Little Lake; it was found that the discharges from the storm sewers occurring only during runoff periods contained domestic wastes and consequently, deteriorated the water quality of the beach area to a degree which would be unsatisfactory for swimming purposes. To protect the recreational interest of Little Lake the contaminating wastes gaining access to the storm sewers should be located and eliminated.

As for the adequacies of private sewage disposal systems utilized adjacent to Little Lake, inspection of the systems by the Simcoe County Health Unit would determine whether the systems are suitable.

The Town of Midland has a municipal by-law which regulates the discharge of water and wastes to the municipal sewers. Results of samples from the municipal storm sewers has shown that some discharges do not meet the criteria set out in the by-law. There are numerous industries in the municipality

and some industrial waste discharges may at times not meet the criteria or accidental spillages may occur without the knowledge of the municipality. For a sewer use by-law to be worthwhile and effective, a by-law enforcement officer should be retained to investigate these matters.

Prepared by: Gary Boretski

G. K. Boretski, Civil Technologist
District Engineers Section
Sanitary Engineering Branch

/cs

APPENDIX A

TOWN OF MIDLAND

MUNICIPAL WATER WORKS - PHYSICAL DESCRIPTION - 1971

SOURCES	-	Water for the municipal system is obtained from 4 wells and 2 surface water collection reservoirs.
Well No. 1	-	Diameter - 5 inches Depth - 70'-2" plus 1 ft. of suction pipe Static Level - 7'-1" Pumping Level - Pump - Layne Turbine centrifugal pump rated at gpm and driven by a HP electric motor Pumping Yield - 150 Igpm
Well No. 2	-	Diameter - 4 inches Depth - 64 feet Static Level - Artesian flowing Pump - Layne Turbine centrifugal pump rated at gpm driven by a H.P. electric motor Pumping Yield - 50 Igpm
Well No. 3	-	Diameter - 5 inches Depth - 102'-8" Static Level - Artesian flowing Pump - Layne Turbine centrifugal pump rated at gpm driven by a H.P. electric motor Pumping Yield - 80 Igpm
Well No. 6	-	Diameter - 6 inches Depth - 73'-8" plus 10'-6" suction Static Level - Pumping Level - Pump - Layne vertical centrifugal pump rated 480 Igpm driven by a 15 H.P. electric motor Pumping Yield - 400 IGPM
Recharge Facilities	-	400 GPM from Georgian Bay

SURFACE WATER COLLECTION RESERVOIRS

	-	Two dams are provided on the spring-fed creek to maintain the water at a sufficient elevation to enter the two collection reservoirs. Water entering the two reservoirs passes through horizontal filters consisting of an open channel filled with coke.
Upper Reservoir	-	Size - 150' x 75' x 3 1/2' deep Capacity - 247,000 gallons

Lower Reservoir	-	Size - 136' x 83' x 4' deep Capacity - 282,000 gallons
Maximum Discharge	-	1500 GPM

MAIN PUMPHOUSE

Service Pumps	-	1 - Babcock-Wilcox & Goldie - McCullock, two stage centrifugal pump rated at 800 gpm @ TDH of 300 ft. driven by an 85 H.P. G.E. electric motor
		1 - Deval centrifugal pump rated at 1,750 gpm @ TDH of 300 ft. driven by a 200 H.P. Westinghouse electric motor
Standby Pumps	-	2 - Deval two-stage centrifugal pumps each rated at 1300 gpm @ TDH of 300 ft. driven by two - 225 H.P. Sterling gasoline engine One of the pumps may also be driven electrically by a 200 H.P. electric motor
Chlorinator	-	1 - Wallace & Tiernan gas chlorinator with tube capacity of 50 lbs. per day

STORAGE FACILITIES	-	Standpipe - 157,000 gallons Elevated Tank - 209,000 gallons

DISTRIBUTION SYSTEM

Size	Type	Length
4"	C.I.	51,000 ft.
4"	Plastic	800 ft.
6"	C.I.	58,205 ft.
8"	C.I.	8,787 ft.
10"	C.I.	20,860 ft.
16"	C.I.	28,000 ft.
12"	Asbestos Cement	8,500 ft.
6"	P.V.C.	1,100 ft.

Fire Hydrants - 197

APPENDIX B

TABLE 1

TOWN OF MIDLAND

MUNICIPAL WATER WORKS - WATER PUMPAGE RECORDS - 1969
(MG)

MONTH	TOTAL PUMPAGE	AVERAGE DAILY PUMPAGE	MAXIMUM DAILY PUMPAGE	MINIMUM DAILY PUMPAGE	TOTAL RCA VICTOR	AVERAGE DAILY CONSUMPTION
Jan.	23.685	0.764	0.851	0.630	2.664	0.852
Feb.	21.239	0.760	0.849	0.674	3.554	0.886
Mar.	23.585	0.760	0.866	0.619	3.253	0.866
Apr.	24.148	0.805	1.011	0.630	4.001	0.940
May	25.553	0.824	1.118	0.598	3.702	0.944
June	23.911	0.797	1.186	0.548	4.339	0.943
July	28.370	0.915	1.261	0.674	3.980	1.042
Aug.	31.667	1.021	1.330	0.360	4.416	1.165
Sept.	24.167	0.806	0.997	0.609	4.279	0.950
Oct.	24.592	0.793	0.907	0.608	4.442	0.938
Nov.	22.806	0.760	0.852	0.599	4.228	0.920
Dec.	22.041	0.711	0.803	0.556	3.884	0.836
TOTAL	295.764				46.742	

AVERAGE DAILY PUMPAGE 0.810 MGD

AVERAGE DAILY CONSUMPTION 0.938 MGD

TOTAL CHLORINE 6698 lbs.

AVERAGE CHLORINE DOSAGE 2.26 ppm

MAXIMUM DAY PUMPAGE 1.330 MGD

MINIMUM DAY PUMPAGE 0.360 MGD

APPENDIX B

TABLE 2

1970 - WATER PUMPAGE RECORDS (MG)

MONTH	TOTAL PUMPAGE	AVERAGE DAILY PUMPAGE	MAXIMUM DAY PUMPAGE	MINIMUM DAY PUMPAGE	TOTAL RCA VICTOR	AVERAGE DAY CONSUMPTION
Jan.	21.840	0.704	0.797	0.534	3.296	0.810
Feb.	20.973	0.749	0.879	0.635	4.165	0.898
Mar.	23.130	0.743	0.822	0.595	3.969	0.875
Apr.	23.013	0.767	0.972	0.614	5.232	0.942
May	23.924	0.772	0.948	0.562	4.795	0.926
June	29.626	0.988	1.600	0.686	4.335	1.130
July	25.282	0.816	1.020	0.577	4.153	0.950
Aug.	32.553	1.050	1.484	0.638	4.238	1.190
Sept.	25.876	0.862	1.038	0.708	3.749	1.320
Oct.	29.029	0.613	1.091	0.760	2.087	1.002
Nov.	27.799	0.927	1.126	0.570	0.819	1.290
Dec.	27.737	0.895	1.049	0.691	.004	0.885
TOTAL	310.782				40.842	

AVERAGE DAILY PUMPAGE 0.851 MGD

AVERAGE DAILY CONSUMPTION .963 MGD

AVERAGE CHLORINE DOSAGE 2.16 ppm

MAXIMUM DAY PUMPAGE 1.600

MINIMUM DAY PUMPAGE 0.534

APPENDIX B

TABLE 3

TOWN OF MIDLAND

MUNICIPAL WATER WORKS - WATER PUMPAGES - 1971 (MG)

MONTH	TOTAL PUMPAGE	AVERAGE DAILY PUMPAGE	MAXIMUM DAY PUMPAGE	MINIMUM DAY PUMPAGE
January	28.581	0.922	1.044	0.733
February	25.740	0.919	1.101	0.722
March	27.631	0.891	0.998	0.813
April	27.902	0.930	1.087	0.688
May	30.939	0.998	1.303	0.780
June	35.857	1.195	1.546	0.889
July	31.729	1.024	1.432	0.759
August	30.202	0.974	1.308	0.771
September	29.928	0.998	1.185	0.782
October	30.969	0.999	1.080	0.838
November	27.676	0.923	1.045	0.812
December	27.293	0.895	1.050	0.709
TOTAL	354.447			
AVERAGE DAILY PUMPAGE		.985 MGD		
MAXIMUM DAY PUMPAGE			1.546 MG	
MINIMUM DAY PUMPAGE				0.688 MG

APPENDIX C

TABLE 1

MIDLAND INDUSTRIES - DAILY WATER CONSUMPTION

NAME	WATER CONSUMPTION	NOT SEWERED
Bausch & Lomb Optical	15,278 GPD (20,300 GPD Ind.)	
Bay Mills Limited	45,800 GPD	
Bay Trim & Access Ltd.		
Day Specialties Ltd.	2,780 GPD	*
Decor Metal Products Ltd.	27,000 GPD	
Fabulous Formals Ltd.		
Furnitex Corporation		
Greening Donald Ltd.	2,430 GPD	*
Harrison Metal Works		
Indusmin Limited	5,737 GPD	
Kindred Industries Limited	55,000 GPD	*
Arthur S. Leitch Company	4,300 GPD	*
E. Leitz Limited	24,980 GPD	
Lembo Corporation	270 GPD	*
Mansfield Footwear Company	4,330 GPD	
Midland Industries	9,032 GPD (60,000 GPD Ind.)	
Midland Planing Mills		
Motorola Limited	5,160 GPD	*
Ogilvie Flour Mills	3,570 GPD	
Pillsbury Canada Ltd.	59,900 GPD	
Pinecrest Products		

NAME	WATER CONSUMPTION	NOT SEWERED
RCA Limited	858 GPD	
Rowika Industries	816 GPD	*
TPL Industries		
Weber Tool & Mold	314 GPD	*
Webster Smallwood Limited		
Wagg's Laundry	756 GPD	
TOTAL	268,311 GPD	
Industrial Usage	80,300 GPD	

APPENDIX C

TABLE 2

RESIDENTIAL WATER CONSUMPTION CALCULATIONS - 1970

Appendix C, Table 1 gives a list of major industries in the municipality and the consumption figures of major users. An approximate total of 270,000 GPD of the average daily PUC consumption is used for industrial purposes.

1970 PUC Average Daily Consumption	=	963,000 GPD
Industrial Demand	=	270,000 GPD
Therefore, Pure Residential Demand	=	693,000 GPD

The pure residential demand is close to the PUC water pumpage during holidays such as Christmas and New Year's when there is complete shutdown of industries and when water from RCA Victor is not required, shown in Appendix B.

WATER CONSUMPTION BREAKDOWN

Number of Water Services	=	3,531
Number of Industrial Services	=	27
Therefore, Number of Residential Services	=	3,504

Average Daily Water Consumption Per Residential Service

$$= \frac{\text{Pure Residential Demand}}{\text{No. of residential services}} = \frac{693,000}{3,504}$$

$$= 198 \text{ gpd}$$

$$= \text{approx. } 200 \text{ gpd}$$

Pure Average Daily Per Capita Consumption $= \frac{693,000}{11,007} = 63$ gpcd

Average Daily Per Capita Consumption with Industries $= \frac{963,000}{11,007} = 87.5$ gpcd

MINISTRY OF THE ENVIRONMENT.

CHEMICAL LABORATORIES

WATER ANALYSIS

All analyses except pH reported in mg/litre unless otherwise indicated

Municipality: Midland

Report to:

c.c. Supervisor of Water Works

Central Files

Source: Midland Water Works

Date Sampled: Feb. 25/71 by: GKB

Lab. No.	Hardness as $CaCO_3$	Alkalinity as $CaCO_3$	Iron as Fe	Chloride as Cl	pH at Lab.	Fluoride as F	Apparent Colour Units	Turbidity Units		
W9-3	180	148	0.25	14	7.6	-	10	1.5		
April 20,1971										
W16-11	142	124	0.15	9	7.8	-	5	1.5		

Lab. No.	Cyanide as HCN	Copper as Cu	Manganese as Mn	Zinc as Zn	Arsenic as As	Barium as Ba	Cadmium as Cd	Chromium as Ch	Lead as Pb	Selenium as Se	Silver as Ag	Nickel as Ni
M9-21	<.01	0.0	0.0	0.12	<0.01	<1	0.0	0.00	0.2	0.0	0.0	-
April 21, 1971												
	0.0	0.03	-	0.04	-	-	0.0	-	0.0	-	-	0.0

12-062

APPENDIX E

TABLE 1

C.U.A. STORAGE AND PUMPAGE CALCULATIONS

Population Served = 11,007

Total Storage = A + B + C

where A = 100 per cent of C.U.A. requirement
B = 25 per cent of maximum day consumption
C = 25 per cent of the sum of A and B

C.U.A. requirement for population (13,000)

= 2,900 GPM for 10 hours

A = 2,900 x 10 x 1.0 x 60 = 1,740,000 gallons

Maximum Day Factor for 10,001 - 25,000 is 1.90

Average Demand (1970) = 963,000 GPD

Maximum Day = 963,000 x 1.90

Therefore, B = 963,000 x 1.90 x 0.25 = 457,425 gallons

C = (A + B) (0.25)
= 549,356

Total Storage = 2,746,781 gallons

or = approximately 2,750,000 gallons

Pumpage Calculations

Total Emergency Pumping Capacity = 880 gpm

Underwriters Fire Demand Requirement = 2,900 gpm for 10 hours

Maximum Day Flow (1.60 MGD actual) = 1,110 gpm

Total Required Flow = 4,010 gpm for 10 hours

(1) For Underwriters' Requirements, two major pumps must be considered inoperative at the time of fire flow. Eliminating wells 1 and 6, this leaves only 130 gpm from wells 2 and 3 plus 880 gpm for 10 hours from the two reservoirs with a resulting storage requirement of

[4,010 - (130 + 880)] (60) (10) = 1,800,000

Existing storage = 366,000

Storage Deficit = 1,434,000

or equivalent pumping = 2,400 GPM

(2) Assuming all pumps are operative, storage requirements may be considered to be [4,010 - 1560] (60) (10) = 1,470,000 gallons.

Existing Storage = 366,000 gallons

Storage Deficit = 1,104,000 gallons

(or equivalent pumping = 1,840 GPM)

APPENDIX E

TABLE 2

OWRC STORAGE AND PUMPAGE CALCULATIONS

STORAGE CALCULATIONS

Population Served = 11,007

Total Storage = A + B + C

where A = 100 per cent of C.U.A. requirement
B = 25 per cent of maximum day consumption
C = 25 per cent of the sum of A and B

C.U.A. requirement for population (13,000) = 2900 GPM for 5 hours

A = 2900 x 60 x 5 = 870,000 gallons

Maximum Day Factor is 1.90

Average Demand (1970) = 963,000 GPD

Maximum Day = 963,000 x 1.90

Therefore, B = 963,000 x 1.90 x 0.25
= 457,000 gallons

C = (A + B)(0.25)
= (870,000 + 457,000) .25
= 1,327,000 x .25
= 332,000 gallons

Total Storage = A + B + C
= 1,659,000

PUMPAGE CALCULATIONS

Total Emergency Pumping Capacity = 1500 GPM

Underwriters Fire Demand Requirement = 2900 GPM

Maximum Day Flow (1.60 MGD) = 1,110 GPM

Total Required Flow = 4,010 GPM for five hours

(1) For Underwriters' Requirements, two major pumps must be considered inoperative at the time of fire flow eliminating wells 1 and 6, this leaves only 130 gpm from wells 2 and 3 plus 1500 gpm for five hours from the two reservoirs with the resulting storage requirement of
[4,010 - (130 + 1500)] (60) (5) = 714,000 gallons.

Existing storage = 366,000 gallons

Storage Deficit = 348,000 gallons

Or equivalent pumping = 1,160 GPM

(2) Assuming all pumps are operative, storage requirements may be considered [4,010 - 2180] 60 x 5 = 549,000 gallons

Existing Storage = 366,000 gallons

Storage Deficit = 183,000 gallons

or equivalent pumping = 610 GPM

APPENDIX F

TOWN OF MIDLAND

MUNICIPAL (OWRC) WATER POLLUTION CONTROL PLANT

PHYSICAL DESCRIPTION

DESIGN DATA:

Population	-	12,500
Per Capita Flow	-	100 GPD
Design Plant Flow	-	1.25 MGD
Maximum Flow	-	5.0 MGD (4 DWF)
Objectives	-	BOD removal - 40 per cent
		S.S. removal- 60 per cent
Raw Sewage Strength	-	BOD - 225 ppm
		S.S. - 300 ppm

INLET SEWER:

3,810 feet of 14-inch diameter forcemain and 100 feet of 15-inch diameter gravity sewer

PRELIMINARY TREATMENT:

1 - barminutor, Chicago Pump Co., Model C, driven by a Continental electric motor, 3 H.P. at 1715 RPM
1 - bar screen - 3/8-inch bars at 1 3/4" c.c. - on the barminutor bypass

PRIMARY TREATMENT

GRIT REMOVAL:

1 - Dorr-Oliver-Long Company, detritor, 12'-0" square, 16" liquid depth with grit rake and washer, driven by a 1 H.P. Westinghouse electric motor at 1730 RPM

Volume - 1,200 gallons
Retention period - 1.38 minutes at design flow

PRIMARY SEDIMENTATION"

2 - Circular tanks, 50'-0" diameter, 8'-0" SWD
Total volume - 195,000 gallons
Retention at design flow - 3.75 hours
Surface settling rate - 319 gallons per square feet per day
Sludge Collection - Dorr-Oliver mechanical scrapers - David Brown right-angled gear drive
Ratio 59.67:1, driven by a 5 H.P., Bull electric motor at 1,700 RPM

CHLORINE CONTACT:

Irregular shape
Volume - 16,200 gallons
Retention - 18.7 minutes at design flow

OUTFALL SEWER:

615 feet of 24-inch diameter sewer to original 30-inch diameter outfall

RECEIVING STREAM:

Georgian Bay (Midland Bay)

DIGESTION:

1 - primary digestion
tank heated, fixed steel cover - 30'-0" diameter
22' liquid depth
Volume - 15,600 cu. ft.

1 - secondary digestion tank, unheated,
fixed steel cover, 30'-0" diameter,
21'-6" liquid depth
Volume - 15,200 cu. ft.
Per capita capacity - 2.47 cu. ft.
Mixing - by draft tube mixers in primary tank - driven by Babcock
Wilcox V-belt drive, Tamper electric motor, 3 H.P. at 1160 RPM
Heating - Cleaver-Brook, Model P740-15,
Heat exchanger - output 50,200 BTU per hour
Supernatant return - to inlet of primary clarifiers
Gas production - for heating - waste gas is burned

PUMPING EQUIPMENT:

Raw Sludge

2 - Carter, Model 800 plunger sludge pumps
60 GPM, driven by a link belt electric motor, 5 H.P. at 1750 RPM

Sludge Recirculation

1 - Gorman-Rupp centrifugal pump, Model 13A2-13, 60 gpm at 40' TDA
driven by a 3 H.P. Westinghouse electric motor at 1750 RPM

Sludge Transfer

1 - Marlowe duplex piston pump, rated at 150 gpm, driven by English
Electric motor, 15 H.P. at 1748 RPM

Transfer can also be effected by gravity.

CHEMICAL TREATMENT:

1 - Wallace & Tiernan gas chlorinator, Type A-711, automatic, capacity 1000 lbs. per 24 hours,

Positions of chlorine feed:

(i) pre
(ii) post
(iii) supernatant return

INSTRUMENTATION:

1 - Kent flow indicator
1 - Kent flow recorder and integrator
2 - Kent digester sludge level indicators
1 - Rockwell, Model 4, sewage gas meter
1 - Level indicator 14 #1 pumping station

BYPASS ARRANGEMENTS:

1 - 14-inch diameter bypass conduit from overflow chamber to outfall sewer to pass all flows in excess of 4 DWF (5 MGD)

PUMPING STATIONS

No. 1 P.S.

2 - Worthington Pump Company, Model 5FLV10, centrifugal pump - 780 GPM, 37' TDH, 1750 RPM, driven by English electric motor, 15 H.P. at 1750 RPM
1 - Worthington Pump Company, Model 8FLV6, centrifugal pump - 2600 GPM, 60' TDH, at 1150 RPM, driven by an English electric motor, 50 H.P. at 1150 RPM

Pump Sequence

#1 pump off, 575.00 feet
#2 pump off, 576.00 feet
#1 pump on, 579.00 feet
#2 pump on, 579.50 feet
#3 pump on, 581.75 feet

Bottom of wet well, 572.00 feet

No. 2 P.S.

2 - Flygt Pump Company, submersible sewage pumps, Model CP100, 100 US GPM 30' TDH, motivated by a 9 H.P. electric motor at 1750 RPM

Pump Sequence

#1 pump off, 581.00 feet
#2 pump off, 583.00 feet

#1 pump on - 584.00
#2 pump on - 586.00

Discharge through 50' of 6-inch diameter forcemain to 14-inch diameter forcemain from P.S. #1

VINDIN STREET PUMPING STATION

Pump #1

- Chicago Pump Company, vertical centrifugal pump, type F, capacity 300 US gpm, at 45' head, driven by a 7 1/2 H.P. electric motor

Pump #2

- Hydromatic horizontal centrifugal pump, Model 40MPD, capacity 360 US gpm, at 30' head, driven by a 7 1/2 H.P., 1750 RPM electric motor

Pump Sequence

Lead Pump #2 on - 578.75
Pump #2 off - 575.75

Standby Pump #1 off - 575.75
Pump #1 on - 579.00

RCA VICTOR P.S.

2 - 4-inch Flygt CP100, submersible sewage pumps
Capacity - 225 US gmp, at 60' head, driven by 9 H.P. electric motor at 1750 RPM

Pump Sequence

Pump #1 on - 577.0
Pump #2 on - 578.0

Pump #1 off - 574.0
Pump #2 off - 575.0

APPENDIX G

TABLE 1

MIDLAND WATER POLLUTION CONTROL PLANT

1970 ORGANIC LOADING AND PLANT EFFICIENCY

MONTH	BIOCHEMICAL OXYGEN DEMAND						SUSPENDED SOLIDS						GRIT REMOVED
	Influent		Effluent		Reduction		Influent		Effluent		Reduction		cu. ft.
	n	mg/l	n	mg/l	%	10^3 lbs.	n	mg/l	n	mg/l	%	10^3 lbs.	
Jan.	1	110	1	34	69	28	1	175	1	65	63	40	18
Feb.	2	80	2	62	23	6	2	220	2	62	72	52	35
Mar.	2	100	2	75	25	11	2	185	2	72	61	48	31
Apr.	1	180	1	38	79	67	1	210	1	85	60	59	55
May	1	120	1	85	29	14	1	190	1	60	68	52	61
June	2	150	2	110	27	15	2	230	2	98	57	50	67
July	1	120	1	85	29	14	1	150	1	60	60	37	195
August	1	110	1	100	9	5	1	130	1	70	46	28	54
Sept.	2	127	2	72	43	22	2	235	2	65	72	68	74
Oct.	2	120	2	74	38	20	2	220	2	80	64	59	160
Nov.	2	87	2	80	8	3	2	205	2	75	63	51	31
Dec.	1	160	1	42	73	46	1	190	1	80	58	43	23
TOTAL	18	-	18	-	-	251	18	-	18	-	-	587	804
AVERAGE	-	118	-	74	37	21	-	202	-	74	63	49	67

NOTE: - n is the number of samples taken

APPENDIX G

TABLE 2

1971 ORGANIC LOADING AND PLANT EFFICIENCY

MONTH	N	BIOCHEMICAL OXYGEN DEMAND			SUSPENDED SOLIDS			GRIT REMOVED
		Influent ppm	Effluent ppm	Reduction %	Influent ppm	Effluent ppm	Reduction %	cu ft
Jan.	2	132	70	47	180	85	52.8	15
Feb.	2	92	82	10.9	205	75	63.4	17.5
Mar.	2	90	59	34.4	230	70	69.6	51
Apr.	2	80	65	18.8	150	60	60.0	69
May	2	97	55	43.3	183	90	50.8	18
June	2	115	97	15.6	223	48	78.5	46
July	2	130	75	42.3	175	65	62.9	93
Aug.	2	110	55	50.0	150	60	60.0	53
Sept.	2	110	77	30.0	230	55	76.1	32
Oct.	2	110	75	31.8	180	60	66.7	30
Nov.	2	110	90	18.2	190	60	68.4	25
Dec.	1	90	80	11.1	220	50	77.3	31
AVERAGE	-	05.5	73.3	30.5	193	64.8	66.4	40.0

APPENDIX G

TABLE 1a

1970 SLUDGE DIGESTION AND DISPOSAL

MONTH	RAW SLUDGE			DIGESTED SLUDGE			SUPERNATANT		SLUDGE DISPOSAL	
	Volume 10^3 gal	Total Solids %	Volume Solids %	Volume 10^3 gal	Total Solids %	Volume Solids %	Volume 10^3gal	Total Solids %	Dewatered cu yd	Liquid cu yd
Jan.	73	-	-	32	-	-	41	-		192
Feb.	67	13.8	43	26	8.1	45	45	.5		156
Mar.	81	6.5	49	28	15.8	34	54	.4		158
Apr.	86	-	-	20	-	-	66	.4		120
May	81	9.4	54	12	-	-	15	-		72
June	74	5.2	55	30	12.5	36	44	.2		150
July	81	2.1	47	24	10.1	35	56	-		144
Aug.	80	10.5	42	17	-	-	64	.5		102
Sept.	81	14.1	38	26	8.6	32	55	.7		156
Oct.	87	17.7	32	26	8.6	28	60	-		156
Nov.	79	16.0	47	22	5.8	43	56	-		132
Dec.	78	-	-	15	-	-	68	-		90
TOTAL	948	-	-	278	-	-	624	-		1638
AVERAGE	79	10.6	45	23	9.9	36	52	.45		137

APPENDIX G

TABLE 2a

1971 SLUDGE DIGESTION AND DISPOSAL

MONTH	RAW SLUDGE			DIGESTED SLUDGE			SUPERNATANT		SLUDGE DISPOSAL
	Volume 10^3 gal	Total Solids %	Volume Solids %	Volume 10^3 gal	Total Solids %	Volume Solids %	Volume 10^3 gal	Total Solids %	Liquid cu yd
Jan.	73.4	12.4	47	12.0	9.5	29	61.4	-	72
Feb.	63.8	12.0	56	21.0	10.6	32	45.8	-	126
Mar.	87.0	10.1	36	35.7	8.5	33	52.0	-	210
Apr.	90.3	18.4	34	31.6	9.9	30	61.0	-	186
May	90.4	11.2	53	30.3	9.3	31	61.8	-	180
June	98.0	12.1	40	26.1	10.2	29	70.6	-	156
July	104.5	6.9	48	32.4	14.0	30	73.5	-	192
Aug.	98.1	18.2	34	20.4	10.8	36	78.0	-	120
Sept.	111.4	17.3	45	30.2	7.6	34	104.3	-	180
Oct.	93.1	7.7	51	25.0	6.5	-	70.2	-	150
Nov.	100.0	9.4	43	19.0	6.7	36	81.0	-	114
Dec.	113.2	-	-	24.1	-	-	83.4	-	144
TOTAL	1123.2	-	-	307.8	-	-	843.0	-	1830
AVERAGE	93.6	12.3	44.3	25.6	9.4	32	70.25	-	152.5

APPENDIX H

TABLE 1

MIDLAND (OWRC) WATER POLLUTION CONTROL PLANT

1970 PLANT FLOWS AND CHLORINATION

MONTH	TOTAL FLOW (MG)	AVERAGE DAILY FLOW (MG)	MAXIMUM DAILY FLOW (MG)	MINIMUM DAILY FLOW (MG)	CHLORINE USED 10^3 lbs.	DOSAGE MG/L
Jan.	36.3	1.17	1.6	.8	3.0	8.3
Feb.	32.8	1.17	1.3	.9	2.5	7.6
Mar.	42.7	1.38	2.3	.9	2.9	6.9
Apr.	47.4	1.58	2.3	1.2	2.6	5.6
May	40.4	1.30	1.5	1.1	3.1	7.7
June	38.1	1.27	1.4	1.0	2.6	6.8
July	40.8	1.31	1.6	1.1	2.6	6.3
Aug.	46.0	1.48	1.4	1.1	2.7	5.9
Sept.	40.0	1.33	1.8	1.1	2.8	6.9
Oct.	42.4	1.36	2.1	1.1	2.6	7.6
Nov.	39.7	1.32	1.5	1.1	2.6	6.6
Dec.	38.8	1.25	2.1	.9	2.3	6.0
TOTAL	485.4	-		-	32.9	-
AVERAGE	-	1.33	-	-	2.7	6.8

APPENDIX H

TABLE 2

MIDLAND (OWRC) WATER POLLUTION CONTROL PLANT

1971 PLANT FLOWS AND CHLORINATION

MONTH	TOTAL FLOW (MG)	AVERAGE DAILY FLOW (MG)	MAXIMUM DAILY FLOW (MG)	CHLORINE USED (lbs.)	CHLORINE DOSAGE (ppm)
Jan.	35.77	1.15	1.41	2,110	5.9
Feb.	35.56	1.27	2.04	2,190	6.2
Mar.	46.42	1.50	1.54	3,020	6.5
Apr. (20 days)	52.53	2.62	4.06	3,090	-
May	N O	M E T E R		2,570	-
June (23 days)	31.33	1.36	1.73	2,570	-
July	39.53	1.27	1.87	2,840	7.2
Aug.	48.83	1.32	1.68	2,420	5.0
Sept.	40.8	1.40	1.72	3,100	7.6
Oct.	45.1	1.50	1.67	3,000	6.7
Nov.	42.66	1.42	1.65	3,160	7.4
Dec.	45.23	1.46	2.50	3,110	6.9
TOTAL (317 days)	463.76	-	-	33,180	-
AVERAGE	-	1.46	-	-	-

APPENDIX I

WATER CONSUMPTION AND SEWAGE FLOW COMPARISONS

1970 SEWAGE FLOWS WITHIN DESIGN FLOW OF 1.25 MGD

Number of days	-	123 days
Number of Saturdays	-	39
Number of Sundays	-	39
Number of Weekdays	-	45
Average Daily Flow to Plant during 123 days	-	1.061 MGD
Average Daily Flow during Saturdays only	-	1.094 MGD
Average Daily Flow during Sundays only	-	1.105 MGD
Average Daily Flow during Weekdays only	-	1.153 MGD
Average Flow during holidays, Christmas and New Year's when no industrial flow occurs	-	.852 MGD

1970 SEWAGE FLOWS OVER DESIGN FLOW

Total Number of Days	-	209
Number of Saturdays	-	6
Number of Sundays	-	6
Number of Weekdays	-	187
Average Flow to plant above the design flow	-	1.383 MGD

1971 SEWAGE FLOWS WITHIN DESIGN

Total Number of Days	-	86
Number of Saturdays	-	27
Number of Sundays	-	25
Number of Weekdays	-	34
Average Daily flow to plant in 86 days	-	1.05 MG
Average Daily flow during Saturdays only	-	1.055 MG
Average Daily flow during Sundays only	-	1.061 MG
Average Daily flow during Weekdays	-	1.177
New Year's holiday	-	.875

1971 SEWAGE FLOWS ABOVE DESIGN FLOW

Total Number of Days	-	164
Average Daily Flow to plant	-	1.604 MGD
Number of Weekend days	-	20 days at 1.692 MGD
Number of Weekdays during 1.25 - 1.50 flow	-	86 days at 1.383 MGD
Number of Weekdays flows between 1.25 - 2.0	-	130 days at 1.4484 MGD
Number of Weekdays flows above 1.5 indicating rain and runoff	-	57 at 1.90 MGD
Average Daily flow above 1.25 MGD	-	1.589 MGD

1970 PUC WATER PUMPAGES WITHIN DESIGN FLOW (Sewage)

Average Daily pumpage in 123 days	-	.807 gpd
Average Daily pumpage on Saturdays	-	.797 gpd
Average Daily pumpage on Sundays	-	.724 gpd
Average Daily pumpage on weekdays	-	.887 gpd
Average pumpage during Christmas, New Year's	-	.643 gpd

1970 PUC WATER PUMPAGE ABOVE DESIGN FLOW (Sewage)

Average pumpage during weekends	-	.749 gpd
Average pumpage during weekdays	-	.911 gpd

1971 PUC PUMPAGE

Days Within Sewage Design Flow

Average Daily pumpage 86 days	-	.909 gpd
Average Daily pumpage Saturdays (27)	-	.853 gpd
Average Daily pumpage Sundays (25)	-	.836 gpd
Average Daily pumpage on weekdays	-	.962 gpd

1971 Flows Above Design

Average Daily pumpage on weekdays	-	1.0654 gpd

Average pumpage during weekends	-	.844 gpd

1970 SEWAGE BYPASSING

Number of days bypassing at plant	-	21 days
Total number of hours bypassed during 21 days	-	21 3/4 hours

1971 SEWAGE BYPASSING

Number of days bypassing at plant	-	18 days
Total number of hours bypassing occurred during 18 days	-	19 hours

APPENDIX J

TABLE 1

ACREAGE OF COMBINED AND SEPARATE SANITARY SEWERS

VINDIN STREET PUMPING STATION

Total number of acres	-	34.9 acres
Combined sewers	-	34.9 acres

SEWAGE PUMPING STATION #1

Total number of acres including Vindin Street pumping station	-	415 acres
Combined sewers	-	209.4 acres

SEWAGE PUMPING STATION #2

Total number of acres	-	66.0 acres
Combined sewers	-	42.0 acres

CHAMBER C - GRAVITY FEED

Total number of acres	-	560.4 acres
Combined sewers	-	185.0 acres

RCA LIMITED PUMPING STATION

Total number of acres	-	200 acres

APPENDIX J

TABLE 2

PUC WATER CONSUMPTION TO SEWERED AND UNSEWERED AREAS

As calculated in Appendix C, Table 2, the average daily consumption for a pure residential service is approximately 198 gpd. In determining the flow to sewered areas, this figure was used for normal residential use and where there was a higher or lower water usage for a service an exact figure was used for that service.

Flow to Vindun Street Pumping Station	-	14,670 gpd
Total Flow to Manhole 6 at Third and Bay Streets including Vindin Street pumping station	-	132,729 gpd
Flow to Manhole 3 at First Street	-	106,227 gpd
Flow to Manhole 2 at King Street	-	90,065 gpd
Flow to Chamber A from Midland Avenue	-	71,671 gpd
Total flow to Chamber A and Pumping Station #1	-	400,692 gpd
Total flow to Chamber B and Pumping Station #2	-	70,217 gpd
Flow to Chamber C from William Street	-	352,196 gpd
Flow from RCA Victor Pumping Station	-	9,706 gpd
Pumpage to unsewered residential area	-	26,354 gpd
Pumpage to unsewered industries	-	71,070 gpd
Pumpage to Pillsbury Canada Limited (sewered)	-	59,900 gpd
Pumpage to Oglivie Flour Mills (sewered)	-	3,570 gpd
Total Estimated Water Consumption	-	993,705 gpd
Actual PUC Water Pumpage	-	963,000 gpd
Percent Error	-	+ 3.2 per cent

It is quite possible that the pure residential consumption per service was estimated too high.

APPENDIX K

TABLE 1

1970 - AMOUNT OF RAINFALL DURING SEWAGE BY-PASSING

DATE	NUMBER OF HOURS BYPASSED	AMOUNT OF PRECIPITATION (inches)	NUMBER OF HOURS RAINFALL	RAINFALL PER HOUR (inches)
March 4	1.0	.72	6.0	.12
March 27	.75	.10	1.0	.10
May 1	.5	.26	1.0	.26
May 5	.25	.77	.5	1.54
May 10	1.0	.69	1.0	.69
June 11	.75	.73	1.0	.73
June 16	1.0	.43	1.0	.43
June 24	1.0	.42	1.0	.42
July 1	1.25	.46	1.5	.31
July 3	2.0	.77	2.0	.38
July 10	1.25	1.54	5.0	.31
July 14	0.5	.52	1.5	.35
July 20	.25	.46	1.5	.31
July 30	0.5	.34	1.0	.34
August 18	0.25	.61	1.5	.41
September 2	2.5	.68	2.5	.27
September 3	1.75	.94	3.0	.31
September 4	1.5	.45	1.5	.30
September 8	1.5	.58	3.0	.19
September 24	.75	.72	1.0	.72
September 26	1.5	.55	1.5	.37

AVERAGE RAINFAL
PER HOUR .42 inches

APPENDIX K

TABLE 2

RUNOFF TO STORM CHAMBER C

Assume an average rainfall of .42 inches per hour

Total area with combined sewers	-	185 acres
1 acre - inch	-	22,621 Imperial gallons
Therefore, total precipitation volume	-	$\frac{185 \text{ acres} \times 22{,}621 \text{ IG} \times 0.42}{\text{acre per inch}}$
	=	approximately 1,760,000 gallons
Estimated volume of runoff to Chamber C, assuming a runoff coefficient of 0.4	-	0.4 x 1,760,000 Gallons
	=	704,000 gallons per hour
	=	11,700 GPM
	=	31.2 cfs

TABLE 3

RUNOFF TO STORM CHAMBER B

Assume an average rainfall of 0.42 inches per hour

Total area with combined sewers	-	42 acres
1 acre - inch	-	22,621 Imperial gallons
Therefore, total precipitation volume	-	$\frac{42 \text{ acres} \times 22{,}621}{\text{acre - inch}} \times 0.42$
	=	approximately 400,000 gallons
Estimated volume of runoff to Chamber B, assuming a runoff coefficient of 0.4	-	0.40 x 400,000 gallons
	=	160,000 gallons per hour
	=	2,670 gpm
	=	7.13 cfs

TABLE 4

RUNOFF TO STORM CHAMBER A

Assume an average rainfall of 0.42 inches in one hour

Total area with combined sewers	-	210 acres
1 acre - inch	-	22,621 Imperial gallons
Therefore, total precipitation volume	-	210 acres x 22,621 IG x 0.42
	=	approximatyly 2,000,000 gallons
Estimated volume of runoff to Chamber A, assuming a runoff coefficient of 0.4	-	0.40 x 2,000,000 gallons
	=	800,000 gallons per hour
	=	13,300 gpm
	=	35.6 cfs

APPENDIX L

TABLE 1

PRECIPITATION SUMMARIES - MIDLAND STATION - 1970

MONTH	PRECIPITATION (inches) Total	Rainfall	NUMBER OF DAYS .01 INCHES OR MORE	HEAVIEST FALL IN MONTH	DATE	DIFFERENCE FROM NORMAL
Jan.	5.62	.15	15	1.30	5	+1.71
Feb.	1.53	.10	12	0.40	10	-1.49
Mar.	2.80	1.30	11	0.72	4	-0.05
Apr.	2.50	1.40	7	0.70	2	-0.41
May	2.31	2.31	13	0.69	10	-0.46
June	2.31	2.31	7	0.73	11	-0.27
July	6.91	6.91	14	1.54	10	+3.75
Aug.	1.76	1.76	6	0.61	18	-1.34
Sept.	5.16	5.16	14	0.94	3	+1.23
Oct.	5.10	5.08	15	0.73	14	+1.73
Nov.	2.13	1.34	16	0.40	23	-1.41
Dec.	3.42	.17	16	0.40	23 & 26	-0.90

TOTAL
PRECIPITATION 41.55

TOTAL
RAIN 27.99 inches

DIFFERENCE FROM
NORMAL 2.09 inches

APPENDIX L

TABLE 2

PRECIPITATION SUMMARIES - MIDLAND STATION - 1971

MONTH	PRECIPITATION (inches) Total	Rainfall	NUMBER OF DAYS .01 INCHES OR MORE	HEAVIEST FALL IN MONTH	DATE	DIFFERENCE FROM NORMAL
Jan.	6.23	.05	23	1.20	26	+2.32
Feb.	4.31	1.31	17	.67	4	+1.29
Mar.	2.45	0.10	12	.70	7	-0.40
Apr.	1.44	.96	8	2.0	23	-1.47
May	1.39	1.39	7	.35	24 & 25	-1.38
June	1.83	1.83	10	1.0	24	-0.75
July	3.60	3.60	12	0.94	22	+0.44
Aug.	1.87	1.87	9	.76	22	-1.23
Sept.	1.84	1.84	9	.98	20	-2.09
Oct.	1.97	1.97	12	.35	8	-1.40
Nov.	2.80	-	-	-	-	-0.74
Dec.	4.66	2.55	12	.80	15	+0.34

TOTAL
PRECIPITATION 34.39 inches

DIFFERENCE FROM
NORMAL - 5.07 inches

APPENDIX L

TABLE 3

1970 - RUNOFF CALCULATIONS

1 acre - foot = 271,454 Imperial gallons

1 acre - inch = 22,621 Imperial gallons

Total Precipitation for 1970 = 41.55 inches

Total Area with combined sewers reaching STP = 436.4 acres

Therefore, total precipitation volume = $\frac{436.4 \text{ acres} \times 22{,}621 \text{ IG}}{\text{acre - inch}} \times 41.55$

= 410,000,000 IG

Runoff coefficient:

Downtown areas	-	0.70 to 0.95
Neighborhood areas	-	0.50 to 0.70
Single family areas	-	0.30 to 0.50
Multi-units, detached	-	0.40 to 0.60
Residential (suburban-	-	0.25 to 0.40
Apartment dwelling areas	-	0.50 to 0.70

Above coefficients from 1967 WPCF Manual of Practice #9 "Design and Construction of Sanitary and Storm Sewers"

Assuming runoff coefficient 0.40

Estimated volume of runoff to sanitary sewers = 0.40 x 410,000,000
= 164,000,000 IG

Number of days of .01 inches or more rainfall = 146 days

Therefore, average daily runoff to sewers = 1,125,000 gallons per day

APPENDIX M

TOWN OF MIDLAND

STORM WATER SEPARATION PROGRAM AND ASSOCIATED SEWAGE WORKS

Actual 1964- 1970
Proposed 1970 - 1974

DESCRIPTION OF WORK	YEAR OF CONSTRUCTION	COST OF CONSTRUCTION	ACCUMULATIVE COST OF CONSTRUCTION
Sewage treatment plant, associated pumping station and sanitary trunk mains	1964	$ 822,029.32	$
Trunk storm sewer William Street	1964	151,734.88	
Sanitary sewer - McCartney Street	1964	3,705.92	977,470.12
Sanitary sewer - Dominion Avenue	1965	6,346.56	983,816.68
Trunk storm sewer - Yonge Street East	1966	99,298.61	
Trunk sanitary sewer and pump station - Wye Valley	1966	302,860.54	1,385,975.83
Sanitary sewer - William Street, south of Hanly Street	1967	6,390.00	
Trunk storm sewer - College - Colborne Streets to outlet chamber (Little Lake)	1967	334,420.70	
Trunk storm sewer - King - Yonge intersection	1967	32,700.00	1,759,486.53
Sanitary sewer - Jeanne Street	1968	6,523.56	
Trunk storm sewer - William Street, Yonge - Ruby	1968	25,191.60	
Trunk storm sewer - Yonge Street, Frederick - Eighth	1968	51,000.00	1,842,201.69
Sanitary sewer, Ottawa, Quebec, Ninth	1969	16,500.00	
Trunk sanitary sewer, Yonge Street - Eighth - Penetang Road	1969	48,129.25	
Trunk storm sewer, Yonge Street - Eighth - Penetang Road	1969	107,280.00	
Storm sewer, Colborne Street. Storm sewer - Russell S reet.	1969	2,358.72	2,016,469.66

Storm sewer, Contract 70-SS-101, Elizabeth, Vindin, Sixth, Victoria, Eighth	1970-71	350,000.00	2,366,469.66
Collector sewer - connection to Colborne - College storm sewer	1971 fore-cast	100,000.00	
Wye River to King Street - industrial area	1971 fore-cast	100,000.00	
Sanitary sewer - South - east sewer - extension from existing sewer westerly to King Street industrial area	1971 fore-cast	200,000.00	
South-east sewer extension from pumping station to Albert - William streets industrial area	1971 fore-cast	100,000.00	
Local improvements - sanitary sewer - Ontario Street	1971 fore-cast	25,000.00	2,891,469.66
Collector sewer - connection to Victoria Street sewer - Seventh - Sixth - Ontario	1972 fore-cast	120,000.00	
Sewer and pumping station - Little Lake area westerly from present system	1972 fore-cast	130,000.00	
Little Lake Park sewer - renewal of	1972 fore-cast	70,000.00	
Local improvement - sanitary sewer - Cornell Drive	1972 fore-cast	25,000.00	3,236,469.66
Storm sewer - Quebec - Ottawa - Montreal streets from Fourth to Sixth streets	1973 fore-cast	80,000.00	
Local improvement - sanitary sewer - Norene Street	1973 fore-cast	25,000.00	3,341,469.66
Water pollution control plant - addition to upgrade to secondary treatment and renewal of plant outfall	1974 fore-	750,000.00	4,091,469.66

APPENDIX N

TABLE 1

TOWN OF MIDLAND

LITTLE LAKE - 1971 BACTERIOLOGICAL SAMPLING SURVEY

SAMPLING LOCATION	DATE SAMPLED	TOTAL COLIFORM	FAECAL COLIFORM	FAECAL STREPTOCOCCUS
L-1	January 26/71	0	0	-
	February 23/71	0	0	-
	March 16/71	4	1	-
	May 3/71	2	1	1
	May 25/71	65	1	4
	June 29/71 (result invalid - control unacceptable)			
	July 27/71	730	4	1
	August 31/71	10	8	8
	September 28/71	138	Lab accident	2
L-1A	January 26/71	0	0	-
	February 23/71	0	0	-
	March 16/71	2	1	1
	May 3/71	1	1	1
	May 25/71	6	1	6
	June 29/71	296	48	74
	July 27/71	500	8	1
	August 31/71	30	4	1
	September 28/71	110	Lab accident	1
L-2	January 26/71	0	0	-
	February 23/71	0	0	-
	March 16/71	4	1	1
	May 3/71	2	1	1
	May 25/71	56	1	6
	June 29/71	432	28	106
	July 27/71	690	8	4
	August 31/71	80	1	4
	September 28/71	370	-	16
L-2A	January 26/71	0	0	-
	February 23/71	0	0	-
	March 16/71	1	1	
	May 3/71	1	1	1
	May 25/71	58	1	1
	June 29/71	368	32	136
	July 27/71	740	4	4
	August 31/71	40	16	16
	September 28/71	510	-	4

L-3	January 26/71	0	0	-
	February 23/71	0	0	-
	March 16/71	26	1	1
	May 3/71	2	1	1
	May 25/71	60	1	2
	June 29/71	356	48	134
	July 27/71	440	4	8
	August 31/71	30	40	1
	September 28/71	620	-	36
L-4	January 26/71	2	2	-
	February 23/71	0	0	-
	March 16/71	2	1	1
	May 3/71	6	1	1
	May 25/71	32	1	1
	June 29/71	200	16	20
	July 27/71	690	1	1
	August 31/71	210	28	1
	September 28/71	330	-	12
L-4A	January 26/71	0	0	-
	February 23/71	0	0	-
	March 16/71	14	1	1
	May 3/71	2	1	1
	May 25/71	46	1	1
	June 29/71	140	12	10
	July 27/71	1190	1	4
	August 31/71	60	1	12
	September 28/71	140	-	1
L-5	January 26/71	4	2	-
	February 23/71	0	0	-
	March 16/71	12	1	-
	May 3/71	4	1	1
	May 25/71	100	1	1
	June 29/71	324	4	4
	July 27/71	1140	1	1
	August 31/71	140	4	1
	September 28/71	200	-	1
L-5A	January 26/71	0	0	-
	February 23/71	0	0	-
	March 16/71	14	1	1
	May 3/71	1	1	1
	May 25/71	120	1	1
	June 29/71	810	1	16
	July 27/71	1200	1	1
	August 31/71	100	4	1
	September 28/71	210	-	4

L-6	January 26/71	0	0	-
	February 23/71	0	0	-
	March 16/71	20	1	1
	May 3/71	8	1	1
	May 25/71	80	1	2
	June 29/71	290	1	20
	July 27/71	870	4	4
	August 31/71	180	1	1
	September 28/71	400	-	2
L-7	January 26/71	0	0	-
	February 23/71	0	0	-
	March 16/71	16	1	1
	May 3/71	1	1	1
	May 25/71	204	8	2
	June 29/71	540	1	1
	July 27/71	690	1	1
	August 31/71	130	1	1
	September 28/71	190	-	4
L-8	January 26/71	0	0	-
	February 23/71	0	0	-
	March 16/71	6	1	1
	May 3/71	4	1	1
	May 25/71	100	1	4
	June 29/71	184	16	8
	July 27/71	3400	4	4
	August 31/71	150	1	1
	September 28/71	320	-	2
L-9	January 26/71	4	0	-
	February 23/71	8	8	-
	March 16/71	28	1	1
	May 3/71	1	1	1
	May 25/71	264	1	4
	June 29/71	140	4	2
	July 27/71	900	Lab accident	1
	August 31/71	130	4	1
	September 28/71	260	-	1
L-10	January 26/71	0	0	-
	February 23/71	0	0	-
	March 16/71	1	1	1
	May 3/71	1	2	1
	May 25/71	84	6	2
	June 29/71	284	8	2
	July 27/71	200	1	1
	August 31/71	260	1	1
	September 28/71	820	-	2

L-10A	January 26/71	0	0	-
	February 23/71	0	0	-
	March 16/71	1	1	1
	May 3/71	2	1	1
	May 25/71	32	6	4
	June 29/71	36	1	4
	July 27/71	370	4	1
	August 31/71	20	1	8
	September 28/71	76	-	1
L-11	January 26/71	0	0	-
	February 23/71	0	0	-
	March 16/71	36	1	
	May 3/71	12	1	1
	May 25/71	36	1	1
	June 29/71	250	4	12
	July 27/71	4100	1	1
	August 31/71	10	1	1
	September 28/71	50	-	1
L-12	January 26/71	0	0	-
	February 23/71	0	0	-
	March 16/71	16	1	-
	May 3/71	8	1	1
	May 25/71	32	1	1
	June 29/71	170	4	4
	July 27/71	880	1	1
	August 31/71	30	1	1
	September 28/71	180	-	2
L-13	January 26/71	0	0	-
	February 23/71	0	0	-
	March 16/71	2	1	1
	May 3/71	1	1	1
	May 25/71	12	1	1
	June 29/71	330	4	1
	July 27/71	600	1	12
	August 31/71	40	4	4
	September 28/71	54	-	2
L-14	January 26/71	0	0	-
	February 23/71	0	0	-
	March 16/71	4	1	1
	May 3/71	4	1	1
	May 25/71	40	4	1
	June 29/71	150	4	12
	July 27/71	8300	4	4
	August 31/71	20	1	4
	September 28/71	106	-	1

L-14A	January 26/71	0	0	-
	February 23/71	0	0	-
	March 16/71	1	1	1
	May 3/71	1	1	1
	May 25/71	84	1	2
	June 29/71	320	8	4
	July 27/71	890	12	80
	August 31/71	10	1	4
	September 28/71	180	-	1
L-15	January 26/71	0	0	-
	February 23/71	0	0	-
	March 16/71	4	1	1
	May 3/71	8	1	2
	May 25/71	40	4	1
	June 29/71	240	16	148
	July 27/71	1500	0	4
	August 31/71	10	1	1
	September 28/71	100	-	1
L-16	January 26/71	0	0	-
	February 23/71	0	0	-
	March 16/71	4	1	1
	May 3/71	1	1	1
	May 25/71	24	4	1
	June 29/71	3200	412	-
	July 27/71	G 15,000	1	1
	August 31/71	20	1	1
	September 28/71	34	-	1
L-17	January 26/71	4	4	-
	February 23/71	0	0	-
	March 16/71	10	2	1
	May 3/71	4	1	1
	May 25/71	48	1	2
	June 29/71	620	404	204
	July 27/71	520	1	1
	August 31/71	10	4	1
	September 28/71	50	-	1

L-18	January 26/71	0	0	-
	February 23/71	0	0	-
	March 16/71	64	1	1
	May 3/71	1	1	1
	May 25/71	100	1	2
	June 29/71	460	52	64
	July 27/71	640	8	1
	August 31/71	40	1	4
	September 28/71	16	-	1
L-19	January 26/71	0	0	-
	February 23/71	0	0	-
	March 16/71	1	1	1
	May 3/71	1	1	1
	May 25/71	310	16	24
	June 29/71	410	20	92
	July 27/71	Lab accident		
	August 31/71	20	4	1
	September 28/71	76	-	2
M-1	January 26/71	0	0	
	February 23/71	0	0	
	March 16/71	Not sampled		
	May 3/71	1	1	1
M-2	January 26/71	0	0	
	February 23/71	0	0	
	March 16/71	Not sampled		
	May 3/71	4	1	1

ANALYSES IN PPM UNLESS
OTHERWISE NOTED

OWRC SURVEY

APPENDIX N, TABLE 2

SAMPLING POINT	LITTLE LAKE STORM SEWERS DESCRIPTION	DATE	5-DAY BOD	SOLIDS TOTAL	SOLIDS SUSP.	SOLIDS DISS.	ANIONIC DETERGENTS AS ABS	NITROGEN AS N FREE AMMONIA	NITROGEN AS N TOTAL KJELDAHL	NITROGEN AS N NITRITE	NITROGEN AS N NITRATE	PHOSPHORUS AS P TOTAL	PHOSPHORUS AS P SOLUBLE	PHENOLS IN PPB	ETHER SOLUBLES	CHLORIDE AS CL	COLIFORM BACTERIA	FECAL COLIFORMS	FECAL STREPTOCOCCUS
LL-1W	STORM SEWER AT LITTLE LAKE BEACH.	APR. 20/71	2.5	**	**	**	0.1							8	TRACE		100	<10	
		SEPT. 5/71	50	450	200	250	1.9		3.0			0.8		20	7	15	8,800,000		
		SEPT. 29/71			**		**	0.4	**	0.5	0.3	**	0.2	9	10	6	1,200,000	2,600	2,800
LL-2W	STORM SEWER TO LITTLE LAKE, WEST OF CEMETARY.	APR. 21/71	3.5	**	**	**	0.2							2	0		1,200	<10	
		SEPT. 5/71	34	300	130	170	1.8		2.0			0.4		20	14	9	560,000		
		SEPT. 29/71			**		0.5	0.4	**	0.9	0.5	**	0.1		6	6	LAB ACCIDENT		
		MAY 27/71	11	290	50	240	0.7							5			30,000	1,000	1,000
		MAY 25/71	3	160	20	140	0.4		0.10			.25					G 3,000	2,160	6,300

ALL ANALYSES IN PPM UNLESS
OTHERWISE NOTED

OWRC SURVEY

APPENDIX N, TABLE 3

SAMPLING POINT	LITTLE LAKE - CHEMICAL WATER QUALITY DESCRIPTION	DATE	5-DAY BOD	SOLIDS			ANIONIC DETERGENTS AS ABS	NITROGEN AS N				PHOSPHORUS AS P		PHENOLS IN PPB	ETHER SOLUBLES
				TOTAL	SUSP.	DISS.		FREE AMMONIA	TOTAL KJELDAHL	NITRITE	NITRATE	TOTAL	SOLUBLE		
L-2	LITTLE LAKE AT ABANDONED STORM SEWER.	MAR. 16/71	2.5	160	5	155	0.1	0.38	1.2	.034	1.9	.014	.001		
		APR. 21/71	0.8	**			**							3	0
		AUG. 31/71	0.6	90	5		0.0	.2	0.75	.01	<.1	0.1	<0.1		
L-1A	LITTLE LAKE BETWEEN ABANDONED STORM SEWER AND NO. 1 STORM SEWER.	APR. 20/71	2.5	**	**	**	0.1							8	TRACE
L-1	LITTLE LAKE AT NO. 1 STORM SEWER.	MAR. 16/71	20.	1010*	320		1.3	0.16	1.6	.080	0.55	.42	.036		
L-5	LITTLE LAKE OPPOSITE NO. 2 STORM SEWER WEST OF CEMETARY.	MAR. 16/71	1.8	120	5	115	0.1	0.06	.57	.007	0.15	.016	.001		
		AUG. 31/71	1.2	90	5		0.0	<.1	0.75	<.01	<.1	0.1	<.1		
L-9	LITTLE LAKE OPPOSITE FARM AREA.	MAR. 16/71	1.0	120	5	115	0.1	0.23	.94	.014	0.31	.022	.002		
		AUG. 31/71	1.2	100	5		0.0	<.1	0.75	<.01	<.1	0.1	<.1		
L-15	LITTLE LAKE AT TAYLOR'S COTTAGES.	AUG. 31/71	1.6	100	5		0.0	<.1	0.75	<.01	<.1	0.1	<.1		

Analyses in ppm unless
otherwise noted

OWRC SURVEY

APPENDIX N, TABLE 3 (CONTD)

SAMPLING POINT	LITTLE LAKE - CHEMICAL WATER QUALITY DESCRIPTION	DATE	HARDNESS AS $CaCO_3$	ALKALINITY AS $CaCO_3$	IRON AS FE	CHLORIDE AS CL	PH AT LAB	APPARENT COLOUR UNITS	TURBIDITY UNITS	SODIUM AS NA	POTASSIUM AS K	MAGNESIUM AD MG	PHENOLS IN PPB	ETHER SOLUBLES
L-2	LITTLE LAKE AT ABANDONED STORM SEWER.	APR. 21/71	27	21	.05	7	7.4	5	2	3	1.0	1		
L-1	LITTLE LAKE AT NO. 1 STORM SEWER.	APR. 21/71	74	172	7.5	331	8.0		**	**	**		12	15
L-5	LITTLE LAKE OPPOSITE NO. 2 STORM SEWER WEST OF CEMETARY.	APR. 21/71	52	43	0.45	29	8.0		**	17	1.7		12	0
L-9	LITTLE LAKE OPPOSITE FARM AREA.	APR. 21/71	58	43	0.20	18	7.6		**	11	2.4		12	0

APPENDIX N

TABLE 4

LITTLE LAKE

MISCELLANEOUS BACTERIOLOGICAL SAMPLE RESULTS

SAMPLE NUMBER	DATE SAMPLED	DESCRIPTION	COLIFORM BACTERIA	FAECAL COLIFORMS	FAECAL STREPTOCOCCUS
L-1	28/5/71	Opposite #1 storm sewer at beach	<10	<10	<10
	20/4/71		<10	<10	-
L-1A	28/5/71	Between #1 storm sewer and abandoned storm sewer	<10	<10	<10
	20/5/71		<10	<10	-
L-2	28/5/71	Opposite abandoned storm sewer at beach	<10	<10	<10
	20/4/71		<10	<10	-
L-3	28/5/71	Opposite Parks Dept. boathouse	<10	<10	<10
	20/4/71		50	10	-
L-2A	20/4/71	Between abandoned storm sewer and boathouse	<10	<10	
LL-1W	29/9/71	Discharge from #1 storm sewer at beach	1,200,000	2,600	2,800
L-19A	29/9/71	Little Lake beach 100' downstream from #1 storm sewer discharge	15,000	G 600	G 600
L-19	29/9/71	Little Lake beach 200' downstream from #1 storm sewer discharge	Lab accident		
L-1A	29/9/71	Little Lake beach 100' upstream from #1 storm sewer discharge	Lab accident		
S-1	28/5/71	Smith cottages, Little Lake at north dock	10	<10	<10
S-2	28/5/71	Smith cottages, second dock	410	<10	60

S-3	28/5/71	Smith cottages,beach area	110	<10	30
S-4	28/5/71	Smith cottages, third dock	230	<10	<10
S-5	28/5/71	Smith cottages, fourth dock	50	<10	<10
S-6	28/5/71	Smith cottages, sixth	210	30	30
T-1	28/5/71	Taylor's cottages	90	<10	<10
T-2	28/5/71	Taylor's cottages	90	10	<10
T-3	28/5/71	Taylor's cottages	80	<10	<10

ANALYSES IN PPM UNLESS
OTHERWISE NOTED

OWRC SURVEY

APPENDIX O, STORM SEWER OUTFALLS

TABLE I

SAMPLING POINT	DESCRIPTION	DATE	5-DAY BOD	SOLIDS TOTAL	SOLIDS SUSP.	SOLIDS DISS.	ANIONIC DETERGENTS AS ABS	NITROGEN AS N FREE AMMONIA	NITROGEN AS N TOTAL KJELDAHL	NITROGEN AS N NITRITE	NITROGEN AS N NITRATE	PHOSPHORUS AS P TOTAL	PHOSPHORUS AS P SOLUBLE	PHENOLS IN PPB	ETHER SOLUBLES	COLIFORM BACTERIA	FECAL COLIFORMS	FECAL STREPTOCOCCUS
M-4 D	DRAINAGE DITCH ON	APR. 21/71	0.6	**	**	**	0.1							2	6	40	<10	
	VINDIN STREET	MAY 27/71	1.2	130	5	125	0.0							3		280	<10	30
		SEPT.30/71	NO FLOW NOTED															
		OCT. 28/71	NO FLOW NOTED			-												
M-4 W	STORM SEWER FROM	APR. 21/71	4.0	320	**		0.1							2		265,000	30,000	
	WOODLAND DRIVE AT	MAY 27/71	10.0	330	10	320	0.1							2		270,000	6,000	230
	VINDIN STREET.	SEPT.30/71	20.0	**	**	**			**			**		8	2	680,000	2,000	40
		OCT. 28/71	480	510	75	435	2.1	8.0	13.	<.01	<.1	12	8.9	22		690,000	10,000	LAB ACCIDENT
M-2 D	DITCH AT SIXTH	APR. 21/71	5.0	**	**	**	0.1							4	0	390	120	
	STREET FROM	MAY 27/71	1.0	360	10	350	0.1							2		5,500	10	40
	DISPOSAL AREA.	SEPT.30/71	NO FLOW NOTED															
		OCT. 28/71	NO FLOW NOTED															
M-3 W	STORM SEWER AT	APR. 21/71	6.0	**	**	**	0.1							6	4	36,000	28,000	
	FIFTH AND VINDIN	MAY 27/71	7.0	540	15	525	0.1							6		76,000	1,800	<10
	STS.	SEPT.30/71	9.0	300	**	**			0.5			.050		12	1	180,000	<10	<10
		OCT. 28/71	6.0	270	5	265	0.1	.20	.50	.01	.44	.090	.002	8		530	<10	
M-4 W	STORM SEWER AT	APR. 21/71	NO FLOW NOTED															
	FOURTH & VINDIN.	MAY 27/71	NO FLOW NOTED															
		SEPT.30/71	NO FLOW NOTED															
		OCT. 28/71	NO FLOW NOTED															
M8-5 D	DRAINAGE FROM	APR. 21/71	0.8	**	**	**	0.1							2	0	50	20	
	MUNICIPAL SPRING	MAY 27/71	1.0	220	10	210	0.0							2		160	10	10
	RESERVOIRS.	SEPT.30/71	NOT SAMPLED															
		OCT. 28/71	0.6	200	10	190	<0.1	.10	.45	<.01	.60	.13	.002	0		500	20	
M-6 W	STORM SEWER AT	APR. 21/71	7.5	**	**	**	0.4							4	9	19,200	7,600	
	FOURTH AND	MAY 27/71	13.	480	15	465	0.1							4		640,000	110,000	530
	QUEBEC STS.	SEPT. 30/71	5.5	530	**	**			1.3			..40		2	5	240,000	1,650	660
		OCT. 28/71	5.5	550	25	525	0.6	8.1	9.0	.22	.68	1.7	1.1	4		82,000	4,700	

ALL ANALYSES IN PPM UNLESS
OTHERWISE NOTED

TABLE I (CONTD)

SAMPLING POINT	DESCRIPTION	DATE	5-DAY BOD	SOLIDS TOTAL COD	SOLIDS SUSP.	SOLIDS DISS.	ANIONIC DETERGENTS AS ABS	NITROGEN AS N FREE AMMONIA	NITROGEN AS N TOTAL KJELDAHL	NITROGEN AS N NITRITE	NITROGEN AS N NITRATE	PHOSPHORUS AS P TOTAL	PHOSPHORUS AS P SOLUBLE	PHENOLS IN PPB	ETHER SOLUBLES	COLIFORM BACTERIA	FECAL COLIFORMS	FECAL STREPTOCOCCUS
M-11 W	STORM SEWER AT	MAY 28/71	5.0	300	15	285	0.1		**			.25				550,000	32,000	1,080
	FIRST STREET.	SEPT.30/71	2.0	310	**	**			0.50			0.10		2	2	130,000	340	170
		OCT. 28/71	2.0	400	5	395	0.2	3.4	9.5	.08	2.3	1.0	1.0	4		56,000	3,200	
M-10 W	STORM SEWER AT	MAY 28/71	1.0	600	15	585	0.1		0.10			.05		3		4,300	50	250
	KING STREET.	SEPT.30/71	1.4	190	**	**			**			**		4	2			
		OCT. 28/71	INSUFFICIENT FLOW															
M-8 W	CATCH BASIN WEST	APR. 21/71	4.0	**			0.3							4	0	89,000	20,000	
	OF CN EXPRESS AT	MAY 28/71	8.0	500	15	485	0.8		2.2			1.4				51,000	6,000	6,000
	MIDLAND AVENUE.	SEPT.30/71	6.0	**	**	**			2.3			1.8		4	5	450,000	2,000	2,600
M-7 W	CATCH BASIN AT MIDLAND AND BAY.	OCT. 28/71	140	4650	850	3800	230	2.0	20.0	.30	0.7	250	32	40		16,000	<1,000	
MB-2 W	STORM SEWER OUT-FALL FROM CHAMBER A.	OCT. 28/71	17.0	310	25	285	0.3	.20	1.0	.08	1.6	0.50	.20	4		133,000	40	
M-12 W	STORM SEWER AT	APR. 21/71	NO FLOW NOTED															
	MANLY AND	MAY 27/71	NO FLOW NOTED															
	GLOUCESTER.	SEPT.30/71	NO FLOW NOTED															
		OCT. 28/71	NO FLOW NOTED															
MB-1 W	STORM SEWER AT	APR. 21/71	0.6	90	**		0.1							2	0	<10	<10	
	WILLIAM STREET.	MAY 28/71	1.0	280	5	275	0.1		1.0			.05				130	10	10
		OCT. 27/71	0.8		5		<0.1	.02	0.25	.002	8.0	.010	<.001			<10	<10	
M-9 W	BAYVIEW HEIGHTS	APR. 21/71	0.6	**			0.1							2	0	70	10	
	SUBDIVISION STORM	MAY 27/71	NO FLOW NOTED															
	SEWER.	SEPT.30/71	NO FLOW NOTED															
		OCT. 28/71	NO FLOW NOTED															

ALL ANALYSES IN PPM UNLESS OTHERWISE NOTED

OWRC SURVEY

TABLE 2

SAMPLING POINT	DESCRIPTION	DATE	5-DAY BOD	SOLIDS TOTAL (COD)	SOLIDS SUSP.	SOLIDS DISS.	ANIONIC DETERGENTS AS ABS	NITROGEN AS N FREE AMMONIA	NITROGEN AS N TOTAL KJELDAHL	NITROGEN AS N NITRITE	NITROGEN AS N NITRATE	PHOSPHORUS AS P TOTAL	PHOSPHORUS AS P SOLUBLE	PHENOLS IN PPB	ETHER SOLUBLES	COLIFORM BACTERIA	FECAL COLIFORMS	FECAL STREPTOCOCCUS
MB-4 I	DECOR METAL PRODUCTS LTD.-MIDLAND BAY AT 8" ∅ OUTFALL.	OCT. 27/71	6.0	30	5		0.5	.04	0.25	.004	<.02					40,000	<100	

* THE 40 OZ. SAMPLE CONSISTED OF CLEAR WATER WITH A SMALL AMOUNT OF OIL-LIKE DROPLETS FLOATING ON THE SURFACE. THE ENTIRE SAMPLE WAS SOLVENT EXTRACTED AND THE YELLOW OILY RESIDUE WAS EXAMINED BY I.R. SPECTROSCOPY. THE SPECTRUM IS TYPICAL OF THAT OF VEGETABLE OIL. THIS WAS CONFIRMED BY GAS CHROMATOGRAPHY AS WELL.

SAMPLING POINT	DESCRIPTION	DATE	5-DAY BOD	SOLIDS TOTAL (COD)	SOLIDS SUSP.	SOLIDS DISS.	ANIONIC DETERGENTS AS ABS	NITROGEN AS N FREE AMMONIA	NITROGEN AS N TOTAL KJELDAHL	NITROGEN AS N NITRITE	NITROGEN AS N NITRATE	PHOSPHORUS AS P TOTAL	PHOSPHORUS AS P SOLUBLE	PHENOLS IN PPB	ETHER SOLUBLES	COLIFORM BACTERIA	FECAL COLIFORMS	FECAL STREPTOCOCCUS
MB-3 I	DECOR METAL PRODUCTS LTD.-MIDLAND BAY AT 6" ∅ OUTFALL.	OCT. 27/71	0.8	<30	5		<0.1	.04	0.25	.002						30,000	<10	
D-I	DAYSCO LTD.- COOLING WATER DISCHARGE.	NOV. 3/71	0.8		50		0.1							3				
MB-I T	MIDLAND WPCP FINAL EFFLUENT.	NOV. 3/71	100	650	70	580	DRIED											
				510	40	470	ASHED											
				140	30	110	LOSS	13	19	1.6	2.4	19	16					

SAMPLING POINT	DESCRIPTION	DATE	5-DAY BOD	SUSP.	FILTERED BOD	COD	PH AT LAB	IDENTIFICATION OF DYE
B-I	DISCHARGE FROM BAY MILLS LTD.- TO SANITARY SEWER SYSTEM.	OCT. 27/71	1000	710	650	5,900	5.6	*

* A 38 OZ. BOTTLE FILLED WITH A BRIGHT BLUE LIQUID WAS SUBMITTED FOR IDENTIFICATION OF DYE. SPOT TESTS ON THE SAMPLE, ON DRIED RESIDUES AND SOLVENT EXTRACTION INDICATED THE PRESENCE OF A TYPE OF ALKYD RESIN, USED ON PROTECTIVE OR DECORATIVE COATINGS. THE BLUE MATERIAL WAS FOUND TO BE A PIGMENT.

APPENDIX P

TABLE 1

MIDLAND BAY

BACTERIOLOGICAL WATER QUALITY SURVEY

BY SIMCOE COUNTY HEALTH UNIT - JUNE 1, 1971

SAMPLE POINT	DESCRIPTION	TOTAL COLIFORMS	FAECAL COLIFORMS
1	Midland-Simcoe elevators	0	0
2	Sunnyside Marina	20	18
3	T.P.L. Industrial Pipe plant	12	12
4	West side downtown grain elevator	200	200
5	East side Pillsbury Flour Mill	14	14
6	Public dock, foot of King Street	32	32
7	Public dock, foot of King Street	32	32
8	Public dock, foot of King Street	8	8
9	Public dock, foot of King Street	14	14
10	Rycroft Marina	4	4
11	Decor Metal Products	4	0
12	Blockhouse	4	4
13	West side of Aberdeen Elevators	6	6
14	Tiffin Grain Elevator	8	2

WYE RIVER

BACTERIOLOGICAL WATER QUALITY SURVEY

BY SIMCOE COUNTY HEALTH UNIT

SAMPLE POINT	DESCRIPTION	DATE SAMPLED	TOTAL COLIFORM	FAECAL COLIFORM
A	Wye River downstream from RCA Victor	June 1/71	8	2
		Aug. 16/71	36	30
B	Wye River at RCA Victor	Aug. 16/71	14	14
C	Wye River north of Hwy. 12	Aug. 16/71	24	20
D	Wye River south of Hwy. 12	June 1/71	14	14
		Aug. 16/71	20	6

ANALYSES IN PPM UNLESS
OTHERWISE NOTED

OWRC SURVEY

APPENDIX P TABLE 2

SAMPLING POINT	MIDLAND BAY AND WYE RIVER DESCRIPTION	DATE	5-DAY BOD	SOLIDS TOTAL	SOLIDS SUSP.	SOLIDS DISS.	ANIONIC DETERGENTS AS ABS	NITROGEN AS N FREE AMMONIA	NITROGEN AS N TOTAL KJELDAHL	NITROGEN AS N NITRITE	NITROGEN AS N NITRATE	PHOSPHORUS AS P TOTAL	PHOSPHORUS AS P SOLUBLE	PHENOLS IN PPB	ETHER SOLUBLES	COLIFORM BACTERIA	FECAL COLIFORM	FECAL STREPTOCOCCUS
MB-1	Midland Bay at Sunnyside Marina	Oct. 28/71	1.0	120	5	115	0.1	.02	.21	.004	.02	.022	.008	0		110	< 10	
MB-2	Midland Bay, north end of Midland Simcoe Elevator dock.	Oct. 28/71														90	< 10	
MB-3	Middle of MS Elevator dock.	Oct. 28/71														190	< 10	
MB-4	South end of MS Elevator dock.	Oct. 28/71														80	< 10	
MB-5	Midland Bay at Public dock.	Oct. 28/71														120	30	
MB-6	Midland Bay at Public dock.	Oct. 28/71														60	< 10	
MB-7	Midland Bay at Public dock.	Oct. 28/71														80	< 10	
MB-8	Midland Bay at Public dock.	Oct. 28/71														190	< 10	
MB-9	Midland Bay opposite Downers Marina.	Oct. 28/71														150	< 10	

APPENDIX Q

TABLE 1

MIDLAND BAY - CHEMICAL ANALYSES

SAMPLING POINT	DESCRIPTION	DATE SAMPLED	CHEMICAL RESULTS
SL-1	Midland Bay at Canada Steamship office near Pillsbury mills	March 16/71	*IR examination of oil * the amber coloured oil was examined as received by infra-red spectroscopy. Comparison of the infra-red spectrum obtained with known reference spectra, indicated that the oil examined was a furnace fuel oil. This type of oil may also be utilized as a diesel fuel oil.
MB-8	Midland Bay at foot of King Street - oil slick	April 23/71	Appearance of sample The sample consisted of a turbid water with a thick layer of oily material on the surface. Analytical Work Solvent extraction, column chromatography and IR spectroscopy was used for separation and identification. The oily material characterized as a mixture of petroleum hydrocarbons (85%) and triglycerides (15%). The petroleum hydrocarbons showed a 9:1 ratio between the aliphatic and aromatic components. The IR examination indicated the presence of fuel oil. However, the odour, the appearance and the viscosity of the sample were similar to that of lubricating

			oil. Therefore, it appears that this oil was a mixture of the two types of oils, either prepared originally as a special product or getting mixed as waste of different origins.
MB-2W	Storm Sewer Chamber A Overflow sampled at manhole at Downers' Marina	April 28/71	*<u>IR Spectroscopy Examination</u> * The infra-red spectrum obtained from the examined oil was characteristic of a mixing consisting of furnace fuel oil as a major component, and some natural fats triglycerides.

OWRC SURVEY

APPENDIX Q TABLE 2

SAMPLING POINT	WYE RIVER DESCRIPTION	DATE	5-DAY BOD	TOTAL	SUSP.	DISS.	ANIONIC DETERGENTS AS ABS	NITROGEN AS N: FREE AMMONIA	TOTAL KJELDAHL	NITRITE	NITRATE	PHOSPHORUS AS P: TOTAL	SOLUBLE	COLIFORM BACTERIA	FECAL COLIFORMS	FECAL STREPTOCOCCUS
W-1	WYE RIVER AT HIGHWAY 12.	Nov. 5/71	0.8	230	5		0.1	.06	.35	.006	.07	.022	.010	388	184	276
W-2	WYE RIVER DOWN-STREAM FROM RCA VICTOR.	Nov. 5/71	1.0	270	10		0.1	.22	.39	.008	.09	.034	.009	308	96	76

APPENDIX R

MUNICIPAL DEVELOPMENT

1. Total Population Served By: Population 11,007

(a)	Water Distribution System	-	3,531 services
(b)	Sewer Collector System	-	3,352 connections

2. Total Number of Lots (including those on registered plans of subdivisions) which have been built on:

(a)	Serviced by Water only	-	179
(b)	Serviced by Sewers only	-	
(c)	Neither Water or Sewage services	-	29

3. Total Number of Vacant Lots Served With:

(a)	Fully serviced (water & sewers)	-	56
(b)	Water Services only	-	nil
(c)	Sewer Services only	-	nil
(d)	Neither Water or Sewer services	-	512

300 residential acres not yet subdivided

Population per service - $\frac{11,007}{3,531}$

= 3.12

APPENDIX S

WATER QUALITY AND EFFLUENT OBJECTIVES

The OWRC Objectives for surface waters is described in a booklet entitled "Guidelines and Criteria for Water Quality Management in Ontario". A copy of the booklet is enclosed in the pocket on the back cover of this report. This publication contains the guidelines and introduces water quality criteria for various uses including public, agricultural and industrial water supply, recreation, aesthetic enjoyment and the propogation of fish and wildlife. The guidelines should be followed to determine the acceptability of a watercourse for various uses.

A few pertinent maximum limits of contaminants in sewage treatment plants and indus rial effluents are listed below. Adequate protection for surface waters except in certain specific instances influenced by local conditions, should be provided if the following concentrations and pH range are not exceeded.

5-Day BOD - not greater than 15 ppm

Suspended Solids - not greater than 15 ppm

Phenols - not greater than 20 ppb

pH - 5.5 to 10.6

Iron - not greater than 17 ppm

Ether Solubles (oil) - not greater than 15 ppm

GLOSSARY OF TERMS

Bacteriological Examination - The Membrane Filter Technique is used to obtain a direct count of coliform organisms. These organisms are the normal inhabitants of intestines of man and other warm-blooded animals. They are always present in large numbers in untreated sewage and are, in general, relatively few in number in

other stream pollutants.

Biochemical Oxygen Demand (BOD) - The Biochemical Oxygen Demand test indicates the amount of oxygen required for stabilization of the decomposable organic matter found in sewage, sewage effluent, polluted waters, or industrial wastes, by aerobic biochemical action.

Solids - Analyses for solids include tests for total, suspended and dissolved solids. The total solids is a measure of a solid in solution and in suspension. Suspended solids indicates the measure of undissolved solids of organic or inorganic nature whereas the dissolved solids is a measure of those solids in solution.

Oils and Ether Soluble Materials - These include oils and all other soluble materials such as tarry substances and greases. The presence of these pollutants renders water difficult and sometimes impractical to treat either for industrial or domestic use. Oils makes streams unsightly and water unfit for bathing.

Phenolic Compounds - The presence of phenol or phenolic equivalents is generally associated with discharges containing petroleum products, or with wastes from some industries. It is generally conceded that adequate protection of surface waters will be provided if the concentration of phenols in waste discharges does not exceed 20 parts per billion (ppb). Phenolic type waste can cause objectionable conditions in water supplies and might taint the flesh of fish.

Alkyl Benzene Sulfonate (ABS)- The Alkyl Benzene Sulfonate portion of the anionic detergents is reported in ppm. The test is generally employed to indicate the presence of domestic wastewater. The popular use of synthetic detergents for general cleaning purposes have resulted in the incidents of residual ABS in streams. As an objective, the ABS concentration should not exceed 0.5 ppm in water used for domestic purposes.

Iron - Water for domestic use should contain less than 0.3 ppm for iron in order to avoid objectionable taste, staining and sediment formation. Iron concentrations of not greater than 17 ppm in waste discharges should permit adequate protection of surface waters.

Nitrogen

Ammonia Nitrogen - or sometimes called free ammonia is the insoluble product in the decomposition of nitrogeneous organic matter. It is also formed when nitrates and nitrites are reduced to ammonia either biologically or chemically. Some small amounts of ammonia, too, may be swept out of the atmosphere by rainwater.

The following values may be of general significance in appraising free ammonia content: Low - 0.015 to 0.03 ppm; Moderate - 0.03 to 0.10 ppm; High - 0.10 or greater.

Total Kjeldahl - is a measure of the total nitrogeneous matter present except that measured as nitrite and nitrate nitrogens. The total kjeldahl less the ammonia nitrogen measures the organic nitrogen present. Ammonia and organic nitrogen determinations are important in determining the availability of nitrogen for biological utilization. The normal range for total kjeldahl would be 0.1 to 0.5 ppm.

Nitrite Nitrogen - Nitrite is usually an intermediate oxidation of ammonia. The significance of nitrites, therefore, varies with their amount, sources, and relation to other constituents of the sample, notably the relative magnitude of ammonia and nitrite present. Since nitrite is rapidly and easily converted to nitrate, its presence in concentrations greater than a few thousandths of a part per million is generally indicative of active biological processes in the water.

Nitrate Nitrogen - Nitrate is the end product of aerobic decomposition of nitrogeneous matter, and its presence carries this significance. Nitrate concentrations is of particular interest in relation to the other forms of nitrogen that may be present in the sample. Nitrates occur in the crust of the earth in many places and are a source of its fertility.

Phosphorus

Total Phosphorus - Total Phosphorus is a measure of both the organic and inorganic forms of phosphorus present.

Soluble Phosphorus - Soluble Phosphorus is a measure of the orthophosphate only and when subtracted from the total phosphorus gives an indication of the concentration of organic phosphorus present, that is, the soluble phosphorus is a measure of the inorganic phosphorus present, except the phosphorus in the form of polyphosphate, which however, in surface waters is usually insignificant. Inorganic phosphorus in concentration in excess of 0.01 ppm may cause nuisance conditions.

APPENDIX T

IMPLEMENTATION OF WATER AND SEWAGE WORKS PROGRAMS

Currently, there are three general methods which may be utilized for implementing sewage and water works programs. These are:

(1) to enter into an agreement with the OWRC for the construction of the treatment and collector works with an obligation to pay the debt retirement and operating charges over the term of the agreement with the facility reverting to the municipality at the end of the term of the agreement,

(2) by requesting the provision of service from a Provincially-owned project, and

(3) by proceeding with the construction independently and meeting capital costs by the sale of debentures.

OWRC/MUNICIPAL PROJECTS

For the construction of water and sewage works under agreement with the Commission, the works are provided and developed under Section 39 to 46 of the Ontario Water Resources Commission Act.

For this type of arrangement the Commission utilizes a sinking fund and consequently, the annual payments are based on a specific debt retirement period and the payments are unchanged for the period of the agreement. This type of project may be financed over a period of time up to a maximum of 30 years. The annual charges for projects constructed under this agreement are determined as follows:

(1) Capital repayment - as noted, OWRC financing is by the sinking fund method and an annual payment of approximately 2 per cent of the capital cost is required to retire a debt over a 30-year period.

(2) Interest - on new Commission projects, interest is calculated at the current

rate.

(3) Reserve Fund - to provide money for repairs and replacements, Section 40 of the Ontario Water Resources Commission Act provides for the establishment of a reserve fund by the Commission. It is important to note that this fund is established in the name of the municipality and the balance consequently, earns interest. It has now been established by Commission minute that the reserve fund billing for each project shall continue only until the fund reaches an amount 10 times the initial annual billing and the reserve fund billing shall be reimposed only when the fund has been depleted to 80 per cent or less of the maximum amount.

(4) Operating Costs - Under OWRC agreement the municipality is responsible only for the operating cost directly attributed to the project in the municipality. Therefore, no charges are made by the Commission for the services of head office personnel who are available as required to advise on the satisfactory operation or maintenance of the project.

PROVINCIALLY-OWNED PROJECTS

In June, 1967, the Honourable J. R. Simonett, Minister of Energy and Resources Management, made an announcement which expanded the authorization of this Commission for the provision of water supply and sewage treatment facilities. This new programme allows the Commission to construct entire water and sewage works facilities for small municipalities. The capital costs of these can be amortized over a 40-year period.

A slight variation of this programme could be implemented in that the municipality may request that this Commission provide only the major water and sewage works facilities as Provincially-owned works and develop the water distribution and sewage collector system under the standard type of Commission project. It would

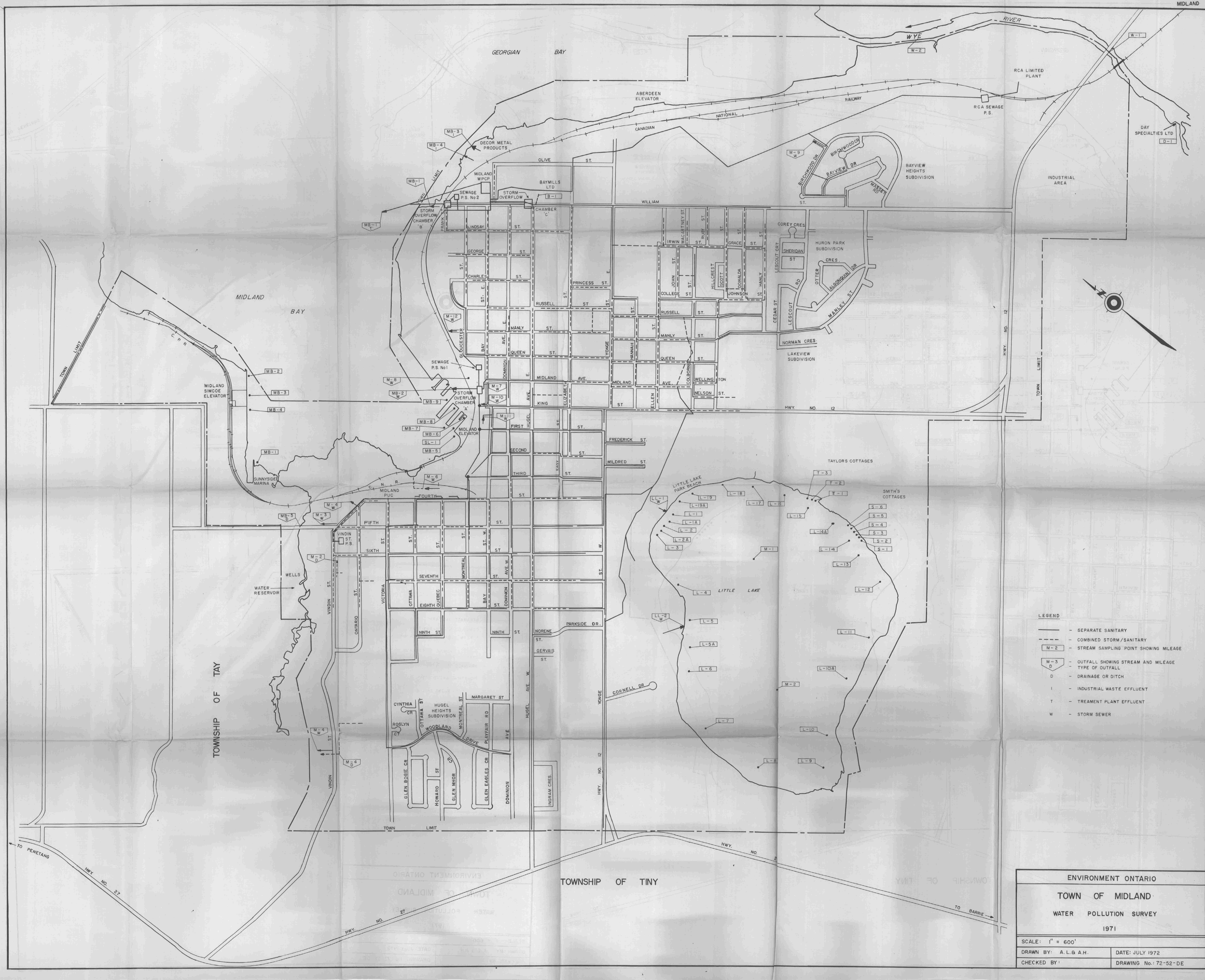
appear that where applicable, it would be more advantageous for the municipality to proceed on the basis of requesting this Commission to develop entire systems as Provincially-owned works.

The associated cost of supplying these works including amortization of capital cost, together with operating and maintenance charges, will be recovered by the sale of service to the affecting municipalities by rates determined on a usage basis. These facilities will be wholly-owned by the Province of Ontario and the arrangements for service will be formalized by contracts between the Commission and the municipality concerned. The installations will be operated entirely at cost with appropriate provision for adjustment in rate.

DEVELOPMENT

If a municipality, after considering the alternatives, wishes the Commission to consider Provincially-financed projects, application forms should be completed and submitted together with a Resolution of the Municipal Council. A draft of the suggested wording of the resolution is included with the application forms.

If the proposed works are to be built by the municipality on its own initiative or as a formal project under agreement with this Commission, it is required that the Council retain a consulting engineer to prepare preliminary engineering reports on the proposed works. If a Provincial system is contemplated no action should be taken with respect to retaining a consulting engineering firm as the Commission will designate a consulting engineer to carry out the Provincial portion of the work and it would be advantageous if the municipal portion be studied and reported on by the same engineer.



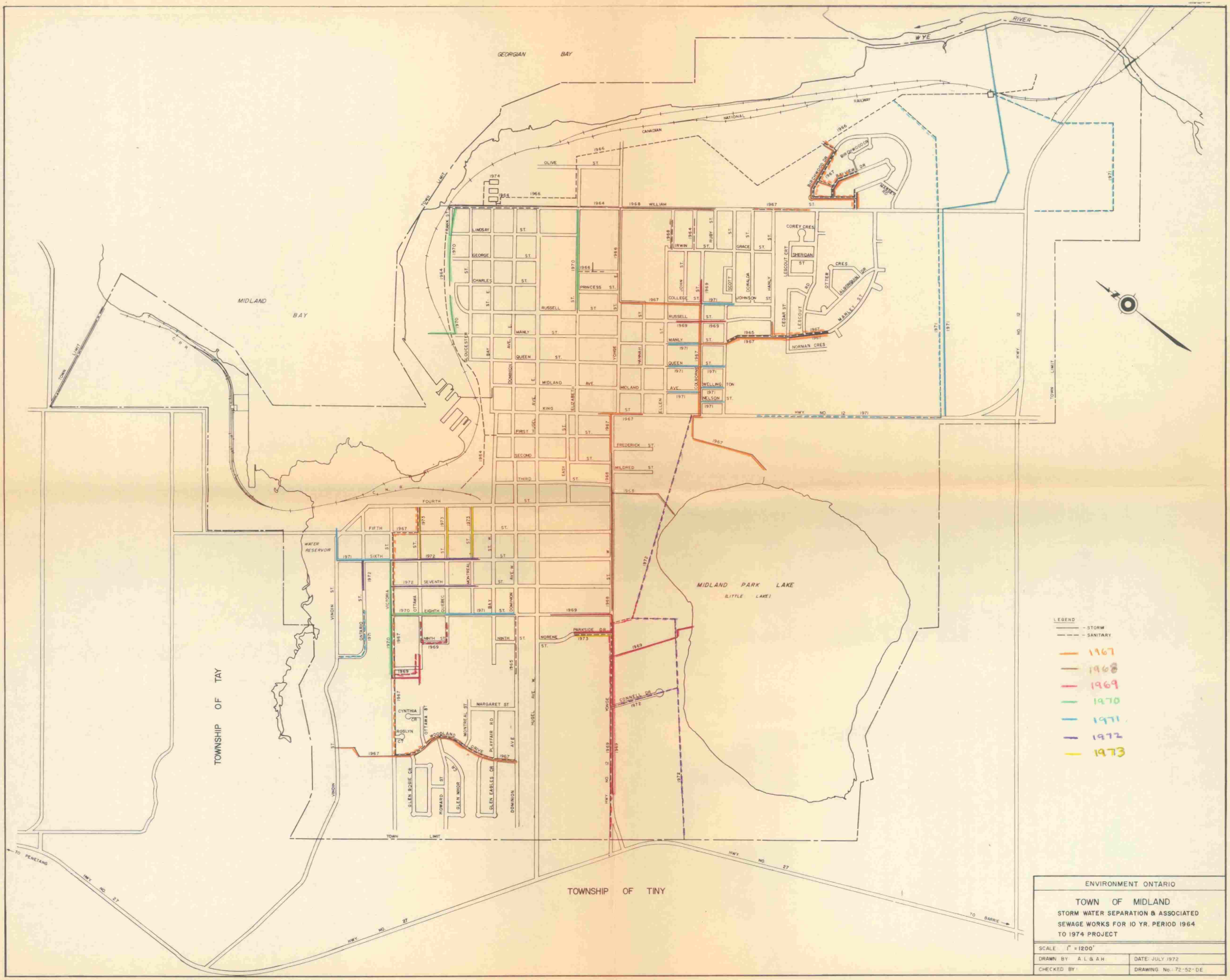
ENVIRONMENT ONTARIO

TOWN OF MIDLAND

WATER POLLUTION SURVEY

1971

SCALE: 1" = 600'	
DRAWN BY: A.L.& A.H.	DATE: JULY 1972
CHECKED BY:	DRAWING No.: 72-52-DE



ENVIRONMENT ONTARIO

TOWN OF MIDLAND

STORM WATER SEPARATION & ASSOCIATED SEWAGE WORKS FOR 10 YR. PERIOD 1964 TO 1974 PROJECT

SCALE 1" = 1200'	
DRAWN BY A L & A H	DATE: JULY 1972
CHECKED BY:	DRAWING No.: 72-52-DE

Date Due

MAR 6 1973			
JUL 18 1973			
FEB 25 1977			